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Exam Code: DP-100
Exam Name: Designing and Implementing a Data Science Solution on Azure

01 - Manage Azure resources for machine learning

QUESTION 1
You are developing a hands-on workshop to introduce Docker for Windows to attendees.
You need to ensure that workshop attendees can install Docker on their devices.
Which two prerequisite components should attendees install on the devices? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Microsoft Hardware-Assisted Virtualization Detection Tool
B. Kitematic
C. BIOS-enabled virtualization
D. VirtualBox
E. Windows 10 64-bit Professional

Correct Answer: C, E
Section:
Explanation:
C: Make sure your Windows system supports Hardware Virtualization Technology and that virtualization is enabled.
Ensure that hardware virtualization support is turned on in the BIOS settings. For example:

E: To run Docker, your machine must have a 64-bit operating system running Windows 7 or higher.
Reference:
https://docs.docker.com/toolbox/toolbox_install_windows/
https://blogs.technet.microsoft.com/canitpro/2015/09/08/step-by-step-enabling-hyper-v-for-use-on-windows-10/

QUESTION 2
Your team is building a data engineering and data science development environment.
The environment must support the following requirements:

support Python and Scala
compose data storage, movement, and processing services into automated data pipelines
the same tool should be used for the orchestration of both data engineering and data science
support workload isolation and interactive workloads
enable scaling across a cluster of machines
You need to create the environment.
What should you do?

A. Build the environment in Apache Hive for HDInsight and use Azure Data Factory for orchestration.
B. Build the environment in Azure Databricks and use Azure Data Factory for orchestration.
C. Build the environment in Apache Spark for HDInsight and use Azure Container Instances for orchestration.
D. Build the environment in Azure Databricks and use Azure Container Instances for orchestration.

Correct Answer: B
Section:
Explanation:
In Azure Databricks, we can create two different types of clusters.
Standard, these are the default clusters and can be used with Python, R, Scala and SQL High-concurrency
Azure Databricks is fully integrated with Azure Data Factory.
Incorrect Answers:
D: Azure Container Instances is good for development or testing. Not suitable for production workloads.
Reference: https://docs.microsoft.com/en-us/azure/architecture/data-guide/technology-choices/data-science-and-machine-learning

QUESTION 3
You plan to build a team data science environment. Data for training models in machine learning pipelines will be over 20 GB in size.
You have the following requirements:
Models must be built using Caffe2 or Chainer frameworks.
Data scientists must be able to use a data science environment to build the machine learning pipelines and train models on their personal devices in both connected and disconnected network environments.
Personal devices must support updating machine learning pipelines when connected to a network.
You need to select a data science environment.
Which environment should you use?

A. Azure Machine Learning Service
B. Azure Machine Learning Studio
C. Azure Databricks
D. Azure Kubernetes Service (AKS)

Correct Answer: A
Section:
Explanation:
The Data Science Virtual Machine (DSVM) is a customized VM image on Microsoft's Azure cloud built specifically for doing data science. Caffe2 and Chainer are supported by DSVM. DSVM integrates with Azure Machine Learning.
Incorrect Answers:
B: Use Machine Learning Studio when you want to experiment with machine learning models quickly and easily, and the built-in machine learning algorithms are sufficient for your solutions.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/data-science-virtual-machine/overview

QUESTION 4

You are implementing a machine learning model to predict stock prices.
The model uses a PostgreSQL database and requires GPU processing.
You need to create a virtual machine that is pre-configured with the required tools.
What should you do?

A. Create a Data Science Virtual Machine (DSVM) Windows edition.
B. Create a Geo Al Data Science Virtual Machine (Geo-DSVM) Windows edition.
C. Create a Deep Learning Virtual Machine (DLVM) Linux edition.
D. Create a Deep Learning Virtual Machine (DLVM) Windows edition.

Correct Answer: A
Section:
Explanation:
In the DSVM, your training models can use deep learning algorithms on hardware that's based on graphics processing units (GPUs).
PostgreSQL is available for the following operating systems: Linux (all recent distributions), 64-bit installers available for macOS (OS X) version 10.6 and newer - Windows (with installers available for 64-bit version; tested on latest versions and back to Windows 2012 R2.
Incorrect Answers:
B: The Azure Geo AI Data Science VM (Geo-DSVM) delivers geospatial analytics capabilities from Microsoft's Data Science VM. Specifically, this VM extends the AI and data science toolkits in the Data Science VM by adding ESRI's market-leading ArcGIS Pro Geographic Information System.
C, D: DLVM is a template on top of DSVM image. In terms of the packages, GPU drivers etc are all there in the DSVM image. Mostly it is for convenience during creation where we only allow DLVM to be created on GPU VM instances on
Azure.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/data-science-virtual-machine/overview

QUESTION 5
You are developing deep learning models to analyze semi-structured, unstructured, and structured data types.
You have the following data available for model building:
Video recordings of sporting events
Transcripts of radio commentary about events
Logs from related social media feeds captured during sporting events
You need to select an environment for creating the model.
Which environment should you use?

A. Azure Cognitive Services
B. Azure Data Lake Analytics
C. Azure HDInsight with Spark MLib
D. Azure Machine Learning Studio

Correct Answer: A
Section:
Explanation:
Azure Cognitive Services expand on Microsoft's evolving portfolio of machine learning APIs and enable developers to easily add cognitive features - such as emotion and video detection; facial, speech, and vision recognition; and speech and language understanding - into their applications. The goal of Azure Cognitive Services is to help developers create applications that can see, hear, speak, understand, and even begin to reason. The catalog of services within Azure
Cognitive Services can be categorized into five main pillars - Vision, Speech, Language, Search, and Knowledge.
Reference: https://docs.microsoft.com/en-us/azure/cognitive-services/welcome

QUESTION 6
You must store data in Azure Blob Storage to support Azure Machine Learning.
You need to transfer the data into Azure Blob Storage.
What are three possible ways to achieve the goal? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Bulk Insert SQL Query
B. AzCopy
C. Python script
D. Azure Storage Explorer
E. Bulk Copy Program (BCP)

Correct Answer: B, C, D
Section:
Explanation:
You can move data to and from Azure Blob storage using different technologies:
Azure Storage-Explorer
AzCopy
Python
SSIS
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/team-data-science-process/move-azure-blob

QUESTION 7
You are moving a large dataset from Azure Machine Learning Studio to a Weka environment.
You need to format the data for the Weka environment.
Which module should you use?

A. Convert to CSV
B. Convert to Dataset
C. Convert to ARFF
D. Convert to SVMLight

Correct Answer: C
Section:
Explanation:
Use the Convert to ARFF module in Azure Machine Learning Studio, to convert datasets and results in Azure Machine Learning to the attribute-relation file format used by the Weka toolset. This format is known as ARFF.
The ARFF data specification for Weka supports multiple machine learning tasks, including data preprocessing, classification, and feature selection. In this format, data is organized by entites and their attributes, and is contained in a single text file.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/convert-to-arff

QUESTION 8
You plan to create a speech recognition deep learning model.
The model must support the latest version of Python.
You need to recommend a deep learning framework for speech recognition to include in the Data Science Virtual Machine (DSVM).
What should you recommend?

A. Rattle
B. TensorFlow
C. Weka
D. Scikit-learn

Correct Answer: B
Section:
Explanation:
TensorFlow is an open-source library for numerical computation and large-scale machine learning. It uses Python to provide a convenient front-end API for building applications with the framework TensorFlow can train and run deep neural networks for handwritten digit classification, image recognition, word embeddings, recurrent neural networks, sequence-to-sequence models for machine translation, natural language processing, and PDE (partial differential equation) based simulations.
Incorrect Answers:
A: Rattle is the R analytical tool that gets you started with data analytics and machine learning.
C: Weka is used for visual data mining and machine learning software in Java.
D: Scikit-learn is one of the most useful libraries for machine learning in Python. It is on NumPy, SciPy and matplotlib, this library contains a lot of efficient tools for machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction.
Reference:
https://www.infoworld.com/article/3278008/what-is-tensorflow-the-machine-learning-library-explained.html

QUESTION 9
You plan to use a Deep Learning Virtual Machine (DLVM) to train deep learning models using Compute Unified Device Architecture (CUDA) computations.
You need to configure the DLVM to support CUDA.
What should you implement?

A. Solid State Drives (SSD)
B. Computer Processing Unit (CPU) speed increase by using overclocking
C. Graphic Processing Unit (GPU)
D. High Random Access Memory (RAM) configuration
E. Intel Software Guard Extensions (Intel SGX) technology

Correct Answer: C
Section:
Explanation:
A Deep Learning Virtual Machine is a pre-configured environment for deep learning using GPU instances.
Reference:
https://azuremarketplace.microsoft.com/en-au/marketplace/apps/microsoft-ads.dsvm-deep-learning

QUESTION 10
You plan to use a Data Science Virtual Machine (DSVM) with the open source deep learning frameworks Caffe2 and PyTorch.
You need to select a pre-configured DSVM to support the frameworks.
What should you create?

A. Data Science Virtual Machine for Windows 2012
B. Data Science Virtual Machine for Linux (CentOS)
C. Geo AI Data Science Virtual Machine with ArcGIS

D. Data Science Virtual Machine for Windows 2016
E. Data Science Virtual Machine for Linux (Ubuntu)

Correct Answer: E
Section:
Explanation:
Caffe2 and PyTorch is supported by Data Science Virtual Machine for Linux.
Microsoft offers Linux editions of the DSVM on Ubuntu 16.04 LTS and CentOS 7.4. Only the DSVM on Ubuntu is preconfigured for Caffe2 and PyTorch.
Incorrect Answers:
D: Caffe2 and PytOCH are only supported in the Data Science Virtual Machine for Linux.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/data-science-virtual-machine/overview

QUESTION 11
You are developing a data science workspace that uses an Azure Machine Learning service.
You need to select a compute target to deploy the workspace.
What should you use?

A. Azure Data Lake Analytics
B. Azure Databricks
C. Azure Container Service
D. Apache Spark for HDInsight

Correct Answer: C
Section:
Explanation:
Azure Container Instances can be used as compute target for testing or development. Use for low-scale CPU-based workloads that require less than 48 GB of RAM.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-deploy-and-where

QUESTION 12
You are solving a classification task.
The dataset is imbalanced.
You need to select an Azure Machine Learning Studio module to improve the classification accuracy.
Which module should you use?

A. Permutation Feature Importance
B. Filter Based Feature Selection
C. Fisher Linear Discriminant Analysis
D. Synthetic Minority Oversampling Technique (SMOTE)

Correct Answer: D
Section:
Explanation:
Use the SMOTE module in Azure Machine Learning Studio (classic) to increase the number of underrepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.
You connect the SMOTE module to a dataset that is imbalanced. There are many reasons why a dataset might be imbalanced: the category you are targeting might be very rare in the population, or the data might

simply be difficult to collect. Typically, you use SMOTE when the class you want to analyze is under-represented.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote

QUESTION 13
You use Azure Machine Learning Studio to build a machine learning experiment.
You need to divide data into two distinct datasets.
Which module should you use?

A. Assign Data to Clusters
B. Load Trained Model
C. Partition and Sample
D. Tune Model-Hyperparameters

Correct Answer: C
Section:
Explanation:
Partition and Sample with the Stratified split option outputs multiple datasets, partitioned using the rules you specified.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/partition-and-sample

QUESTION 14
You are creating a machine learning model. You have a dataset that contains null rows.
You need to use the Clean Missing Data module in Azure Machine Learning Studio to identify and resolve the null and missing data in the dataset.
Which parameter should you use?

A. Replace with mean
B. Remove entire column
C. Remove entire row
D. Hot Deck
E. Custom substitution value
F. Replace with mode

Correct Answer: C
Section:
Explanation:
Remove entire row: Completely removes any row in the dataset that has one or more missing values. This is useful if the missing value can be considered randomly missing.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 15
You plan to provision an Azure Machine Learning Basic edition workspace for a data science project.
You need to identify the tasks you will be able to perform in the workspace.
Which three tasks will you be able to perform? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Create a Compute Instance and use it to run code in Jupyter notebooks.

B. Create an Azure Kubernetes Service (AKS) inference cluster.
C. Use the designer to train a model by dragging and dropping pre-defined modules.
D. Create a tabular dataset that supports versioning.
E. Use the Automated Machine Learning user interface to train a model.

Correct Answer: A, B, D
Section:
Explanation:
Incorrect Answers:
C, E: The UI is included the Enterprise edition only.
Reference:
https://azure.microsoft.com/en-us/pricing/details/machine-learning/

QUESTION 16
A set of CSV files contains sales records. All the CSV files have the same data schema.
Each CSV file contains the sales record for a particular month and has the filename sales.csv. Each file in stored in a folder that indicates the month and year when the data was recorded. The folders are in an Azure blob container for which a datastore has been defined in an Azure Machine Learning workspace. The folders are organized in a parent folder named sales to create the following hierarchical structure:

```
/sales
  /01-2019
    /sales.csv
  /02-2019
    /sales.csv
  /03-2019
    /sales.csv
  ...
```

At the end of each month, a new folder with that month's sales file is added to the sales folder.
You plan to use the sales data to train a machine learning model based on the following requirements:
You must define a dataset that loads all of the sales data to date into a structure that can be easily converted to a dataframe.
You must be able to create experiments that use only data that was created before a specific previous month, ignoring any data that was added after that month.
You must register the minimum number of datasets possible.
You need to register the sales data as a dataset in Azure Machine Learning service workspace.
What should you do?

A. Create a tabular dataset that references the datastore and explicitly specifies each 'sales/mm-yyyy/sales.csv' file every month. Register the dataset with the name sales_dataset each month, replacing the existing dataset and specifying a tag named month indicating the month and year it was registered. Use this dataset for all experiments.
B. Create a tabular dataset that references the datastore and specifies the path 'sales/*/sales.csv', register the dataset with the name sales_dataset and a tag named month indicating the month and year it was registered, and use this dataset for all experiments.
C. Create a new tabular dataset that references the datastore and explicitly specifies each 'sales/mm-yyyy/sales.csv' file every month. Register the dataset with the name sales_dataset_MM-YYYY each month with appropriate MM and YYYY values for the month and year. Use the appropriate month-specific dataset for experiments.
D. Create a tabular dataset that references the datastore and explicitly specifies each 'sales/mm-yyyy/sales.csv' file. Register the dataset with the name sales_dataset each month as a new version and with a tag named month indicating the month and year it was registered. Use this dataset for all experiments, identifying the version to be used based on the month tag as necessary.

Correct Answer: B
Section:
Explanation:
Specify the path.
Example:
The following code gets the workspace existing workspace and the desired datastore by name. And then passes the datastore and file locations to the path parameter to create a new TabularDataset, weather_ds.

```
from azureml.core import Workspace, Datastore, Dataset
datastore_name = 'your datastore name'
# get existing workspace
workspace = Workspace.from_config()
# retrieve an existing datastore in the workspace by name
datastore = Datastore.get(workspace, datastore_name)
# create a TabularDataset from 3 file paths in datastore
datastore_paths = [(datastore, 'weather/2018/11.csv'),
(datastore, 'weather/2018/12.csv'),
(datastore, 'weather/2019/*.csv')]
weather_ds = Dataset.Tabular.from_delimited_files(path=datastore_paths)
```

QUESTION 17
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are using Azure Machine Learning Studio to perform feature engineering on a dataset.
You need to normalize values to produce a feature column grouped into bins.
Solution: Apply an Entropy Minimum Description Length (MDL) binning mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
Entropy MDL binning mode: This method requires that you select the column you want to predict and the column or columns that you want to group into bins. It then makes a pass over the data and attempts to determine the number of bins that minimizes the entropy. In other words, it chooses a number of bins that allows the data column to best predict the target column. It then returns the bin number associated with each row of your data in a column named
<colname>quantized.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/group-data-into-bins

QUESTION 18
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are a data scientist using Azure Machine Learning Studio.
You need to normalize values to produce an output column into bins to predict a target column.
Solution: Apply a Quantiles normalization with a QuantileIndex normalization.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:

Use the Entropy MDL binning mode which has a target column.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/group-data-into-bins

QUESTION 19
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are creating a new experiment in Azure Machine Learning Studio.
One class has a much smaller number of observations than the other classes in the training set.
You need to select an appropriate data sampling strategy to compensate for the class imbalance.
Solution: You use the Scale and Reduce sampling mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Instead use the Synthetic Minority Oversampling Technique (SMOTE) sampling mode.
Note: SMOTE is used to increase the number of underepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.
Incorrect Answers:
Common data tasks for the Scale and Reduce sampling mode include clipping, binning, and normalizing numerical values.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/data-transformation-scale-and-reduce

QUESTION 20
You are analyzing a dataset by using Azure Machine Learning Studio.
You need to generate a statistical summary that contains the p-value and the unique count for each feature column.
Which two modules can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Computer Linear Correlation
B. Export Count Table
C. Execute Python Script
D. Convert to Indicator Values
E. Summarize Data

Correct Answer: B, E
Section:
Explanation:
The Export Count Table module is provided for backward compatibility with experiments that use the Build Count Table (deprecated) and Count Featurizer (deprecated) modules.
E: Summarize Data statistics are useful when you want to understand the characteristics of the complete dataset. For example, you might need to know:
How many missing values are there in each column?
How many unique values are there in a feature column?
What is the mean and standard deviation for each column?

The module calculates the important scores for each column, and returns a row of summary statistics for each variable (data column) provided as input.
Incorrect Answers:
A: The Compute Linear Correlation module in Azure Machine Learning Studio is used to compute a set of Pearson correlation coefficients for each possible pair of variables in the input dataset.
C: With Python, you can perform tasks that aren't currently supported by existing Studio modules such as:
Visualizing data using matplotlib
Using Python libraries to enumerate datasets and models in your workspace
Reading, loading, and manipulating data from sources not supported by the Import Data module
D: The purpose of the Convert to Indicator Values module is to convert columns that contain categorical values into a series of binary indicator columns that can more easily be used as features in a machine learning model.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/export-count-table
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/summarize-data

QUESTION 21
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are analyzing a numerical dataset which contains missing values in several columns.
You must clean the missing values using an appropriate operation without affecting the dimensionality of the feature set.
You need to analyze a full dataset to include all values.
Solution: Use the Last Observation Carried Forward (LOCF) method to impute the missing data points.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Instead use the Multiple Imputation by Chained Equations (MICE) method.
Replace using MICE: For each missing value, this option assigns a new value, which is calculated by using a method described in the statistical literature as "Multivariate Imputation using Chained Equations" or "Multiple Imputation by Chained Equations". With a multiple imputation method, each variable with missing data is modeled conditionally using the other variables in the data before filling in the missing values.
Note: Last observation carried forward (LOCF) is a method of imputing missing data in longitudinal studies. If a person drops out of a study before it ends, then his or her last observed score on the dependent variable is used for all subsequent (i.e., missing) observation points. LOCF is used to maintain the sample size and to reduce the bias caused by the attrition of participants in a study.
Reference:
https://methods.sagepub.com/reference/encyc-of-research-design/n211.xml https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074241/

QUESTION 22
You plan to deliver a hands-on workshop to several students. The workshop will focus on creating data visualizations using Python. Each student will use a device that has internet access.
Student devices are not configured for Python development. Students do not have administrator access to install software on their devices. Azure subscriptions are not available for students.
You need to ensure that students can run Python-based data visualization code.
Which Azure tool should you use?

A. Anaconda Data Science Platform
B. Azure BatchAI
C. Azure Notebooks
D. Azure Machine Learning Service

Correct Answer: C
Section:
Explanation:
Reference: https://notebooks.azure.com/

QUESTION 23
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are analyzing a numerical dataset which contains missing values in several columns.
You must clean the missing values using an appropriate operation without affecting the dimensionality of the feature set.
You need to analyze a full dataset to include all values.
Solution: Replace each missing value using the Multiple Imputation by Chained Equations (MICE) method.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
Replace using MICE: For each missing value, this option assigns a new value, which is calculated by using a method described in the statistical literature as "Multivariate Imputation using Chained Equations" or "Multiple Imputation by Chained Equations". With a multiple imputation method, each variable with missing data is modeled conditionally using the other variables in the data before filling in the missing values.
Note: Multivariate imputation by chained equations (MICE), sometimes called "fully conditional specification" or "sequential regression multiple imputation" has emerged in the statistical literature as one principled method of addressing missing data. Creating multiple imputations, as opposed to single imputations, accounts for the statistical uncertainty in the imputations. In addition, the chained equations approach is very flexible and can handle variables of varying types (e.g., continuous or binary) as well as complexities such as bounds or survey skip patterns.
Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074241/ https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 24
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are analyzing a numerical dataset which contains missing values in several columns.
You must clean the missing values using an appropriate operation without affecting the dimensionality of the feature set.
You need to analyze a full dataset to include all values.
Solution: Remove the entire column that contains the missing data point.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use the Multiple Imputation by Chained Equations (MICE) method.
Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074241/ https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 25

You are creating a new experiment in Azure Machine Learning Studio. You have a small dataset that has missing values in many columns. The data does not require the application of predictors for each column. You plan to use the Clean
Missing Data.
You need to select a data cleaning method.
Which method should you use?

A. Replace using Probabilistic PCA
B. Normalization
C. Synthetic Minority Oversampling Technique (SMOTE)
D. Replace using MICE

Correct Answer: A
Section:
Explanation:
Replace using Probabilistic PCA: Compared to other options, such as Multiple Imputation using Chained Equations (MICE), this option has the advantage of not requiring the application of predictors for each column. Instead, it approximates the covariance for the full dataset. Therefore, it might offer better performance for datasets that have missing values in many columns.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 26
You use Azure Machine Learning Studio to build a machine learning experiment.
You need to divide data into two distinct datasets.
Which module should you use?

A. Split Data
B. Load Trained Model
C. Assign Data to Clusters
D. Group Data into Bins

Correct Answer: D
Section:
Explanation:
The Group Data into Bins module supports multiple options for binning data. You can customize how the bin edges are set and how values are apportioned into the bins.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/group-data-into-bins

QUESTION 27
You are a lead data scientist for a project that tracks the health and migration of birds. You create a multi-class image classification deep learning model that uses a set of labeled bird photographs collected by experts.
You have 100,000 photographs of birds. All photographs use the JPG format and are stored in an Azure blob container in an Azure subscription.
You need to access the bird photograph files in the Azure blob container from the Azure Machine Learning service workspace that will be used for deep learning model training. You must minimize data movement.
What should you do?

A. Create an Azure Data Lake store and move the bird photographs to the store.
B. Create an Azure Cosmos DB database and attach the Azure Blob containing bird photographs storage to the database.
C. Create and register a dataset by using TabularDataset class that references the Azure blob storage containing bird photographs.

D. Register the Azure blob storage containing the bird photographs as a datastore in Azure Machine Learning service.
E. Copy the bird photographs to the blob datastore that was created with your Azure Machine Learning service workspace.

Correct Answer: D
Section:
Explanation:
We recommend creating a datastore for an Azure Blob container. When you create a workspace, an Azure blob container and an Azure file share are automatically registered to the workspace.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-access-data

QUESTION 28
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are analyzing a numerical dataset which contains missing values in several columns.
You must clean the missing values using an appropriate operation without affecting the dimensionality of the feature set.
You need to analyze a full dataset to include all values.
Solution: Calculate the column median value and use the median value as the replacement for any missing value in the column.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use the Multiple Imputation by Chained Equations (MICE) method.
Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074241/ https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 29
You create an Azure Machine Learning workspace.
You must create a custom role named DataScientist that meets the following requirements:
Role members must not be able to delete the workspace.
Role members must not be able to create, update, or delete compute resource in the workspace.
Role members must not be able to add new users to the workspace.
You need to create a JSON file for the DataScientist role in the Azure Machine Learning workspace.
The custom role must enforce the restrictions specified by the IT Operations team.
Which JSON code segment should you use?

A.

```
{
"Name": "DataScientist",
     "IsCustom": true,
     "Description": "Project Data Scientist role",
     "Actions": ["*"],
     "NotActions":[
     "Microsoft.MachineLearningServices/workspaces/*/delete",
     "Microsoft.MachineLearningServices/workspaces/computes/*/write",
     "Microsoft.MachineLearningServices/workspaces/computes/*/delete",
     "Microsoft.Authorization/*/write"
],
"AssignableScopes": [
  "/subscriptions/<id>/resourceGroups/ml-rg/providers/Microsoft.MachineLearningServices/workspaces/ml-ws"
 ]
}
```

B.

```
{
"Name": "DataScientist",
"IsCustom": true,
"Description": "Project Data Scientist role",
"Actions": ["*"],
"NotActions":[],
"AssignableScopes": [
    "/subscriptions/<id>/resourceGroups/ml-rg/providers/Microsoft.MachineLearningServices/workspaces/ml-ws"
]
}
```

C.

```
{
"Name": "DataScientist",
"IsCustom": true,
"Description": "Project Data Scientist role",
"Actions": ["Microsoft.MachineLearningServices/workspaces/*/delete",
     "Microsoft.MachineLearningServices/workspaces/computes/*/write",
     "Microsoft.MachineLearningServices/workspaces/computes/*/delete",
     "Microsoft.Authorization/*/write"
],
"NotActions":[],
"AssignaleScopes":[
     "/subscriptions/<id>/resourceGroups/ml-rg/providers/Microsoft.MachineLearningServices/workspaces/ml-ws"
]
}
```

D.

```
{
"Name": "DataScientist",
"IsCustom": true,
"Description": "Project Data Scientist role",
"Actions": [],
"NotActions":["*"],
"AssignableScopes": [
     "/subscriptions/<id>/resourceGroups/ml-rg/providers/Microsoft.MachineLearningServices/workspaces/ml-ws"
]
}
```

Correct Answer: A
Section:

Explanation:
The following custom role can do everything in the workspace except for the following actions:
It can't create or update a compute resource.
It can't delete a compute resource.
It can't add, delete, or alter role assignments.
It can't delete the workspace.
To create a custom role, first construct a role definition JSON file that specifies the permission and scope for the role. The following example defines a custom role named "Data Scientist Custom" scoped at a specific workspace level:
data_scientist_custom_role.json :
{
"Name": "Data Scientist Custom",
"IsCustom": true,
"Description": "Can run experiment but can't create or delete compute.",
"Actions": ["*"],
"NotActions": [
"Microsoft.MachineLearningServices/workspaces/*/delete",
"Microsoft.MachineLearningServices/workspaces/write",
"Microsoft.MachineLearningServices/workspaces/computes/*/write",
"Microsoft.MachineLearningServices/workspaces/computes/*/delete",
"Microsoft.Authorization/*/write"
],
"AssignableScopes": [
"/subscriptions/<subscription_id>/resourceGroups/<resource_group_name>/providers/Microsoft.MachineLearningServices/workspaces/<workspace_name>"
]
}
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-assign-roles

QUESTION 30
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are a data scientist using Azure Machine Learning Studio.
You need to normalize values to produce an output column into bins to predict a target column.
Solution: Apply an Equal Width with Custom Start and Stop binning mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use the Entropy MDL binning mode which has a target column.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/group-data-into-bins

QUESTION 31

Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are a data scientist using Azure Machine Learning Studio.
You need to normalize values to produce an output column into bins to predict a target column.
Solution: Apply a Quantiles binning mode with a PQuantile normalization.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use the Entropy MDL binning mode which has a target column.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/group-data-into-bins

QUESTION 32
You are with a time series dataset in Azure Machine Learning Studio.
You need to split your dataset into training and testing subsets by using the Split Data module.
Which splitting mode should you use?

A. Recommender Split
B. Regular Expression Split
C. Relative Expression Split
D. Split Rows with the Randomized split parameter set to true

Correct Answer: D
Section:
Explanation:
Split Rows: Use this option if you just want to divide the data into two parts. You can specify the percentage of data to put in each split, but by default, the data is divided 50-50.
Incorrect Answers:
B: Regular Expression Split: Choose this option when you want to divide your dataset by testing a single column for a value. C: Relative Expression Split: Use this option whenever you want to apply a condition to a number column.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/split-data

QUESTION 33
You create an Azure Machine Learning workspace. You are preparing a local Python environment on a laptop computer. You want to use the laptop to connect to the workspace and run experiments.
You create the following config.json file.
{
"workspace_name" : "ml-workspace"
}
You must use the Azure Machine Learning SDK to interact with data and experiments in the workspace.
You need to configure the config.json file to connect to the workspace from the Python environment.
Which two additional parameters must you add to the config.json file in order to connect to the workspace? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. login
B. resource_group
C. subscription_id
D. key
E. region

Correct Answer: B, C
Section:
Explanation:
To use the same workspace in multiple environments, create a JSON configuration file. The configuration file saves your subscription (subscription_id), resource (resource_group), and workspace name so that it can be easily loaded.
The following sample shows how to create a workspace.
from azureml.core import Workspace ws = Workspace.create(name='myworkspace', subscription_id='<azure-subscription-id>', resource_group='myresourcegroup', create_resource_group=True, location='eastus2'
)
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.workspace.workspace

QUESTION 34
You create an Azure Machine Learning compute resource to train models. The compute resource is configured as follows:
Minimum nodes: 2
Maximum nodes: 4
You must decrease the minimum number of nodes and increase the maximum number of nodes to the following values:
Minimum nodes: 0
Maximum nodes: 8
You need to reconfigure the compute resource.
What are three possible ways to achieve this goal? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

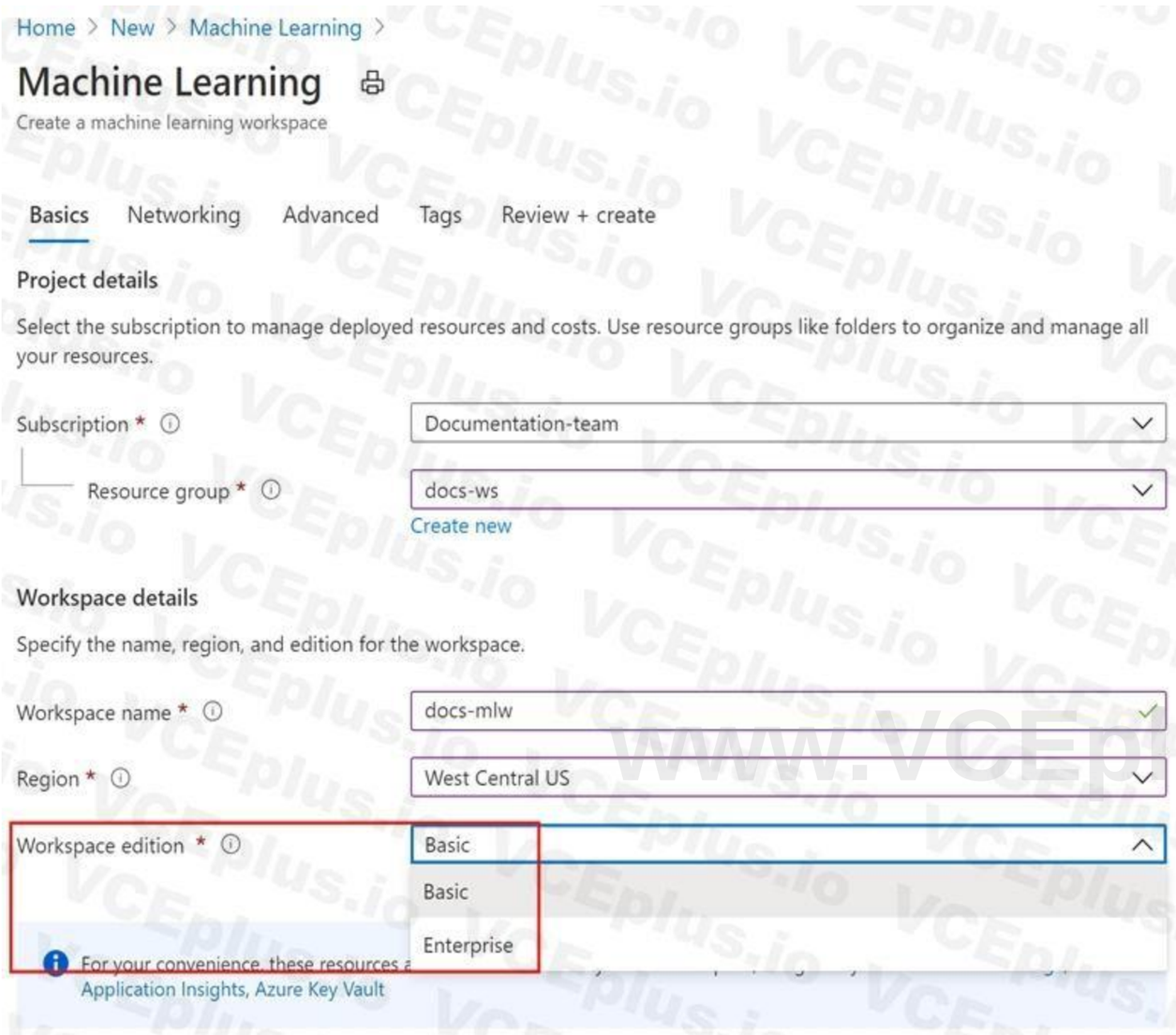
A. Azure Machine Learning designer
B. Azure CLI ml extension v2
C. Azure Machine Learning studio
D. BuildContext class in Python SDK v2
E. MLClient class in Python SDK v2

Correct Answer: A, B, E
Section:
Explanation:
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.compute.amlcompute(class)

QUESTION 35
You create a new Azure subscription. No resources are provisioned in the subscription.
You need to create an Azure Machine Learning workspace.
What are three possible ways to achieve this goal? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Run Python code that uses the Azure ML SDK library and calls the Workspace.get method with name, subscription_id, and resource_group parameters.
B. Navigate to Azure Machine Learning studio and create a workspace.
C. Use the Azure Command Line Interface (CLI) with the Azure Machine Learning extension to call the az group create function with --name and --location parameters, and then the az ml workspace create function, specifying -w and - gparameters for the workspace name and resource group.
D. Navigate to Azure Machine Learning studio and create a workspace.
E. Run Python code that uses the Azure ML SDK library and calls the Workspace.get method with name, subscription_id, and resource_group parameters.

Correct Answer: B, C, D
Section:
Explanation:
B: You can create a workspace in the Azure Machine Learning studio
C: You can create a workspace for Azure Machine Learning with Azure CLI
Install the machine learning extension.
Create a resource group: az group create --name <resource-group-name> --location <location>
To create a new workspace where the services are automatically created, use the following command: az ml workspace create -w <workspace-name> -g <resource-group-name>
D: You can create and manage Azure Machine Learning workspaces in the Azure portal.
1. Sign in to the Azure portal by using the credentials for your Azure subscription.
2. In the upper-left corner of Azure portal, select + Create a resource.
3. Use the search bar to find Machine Learning.
4. Select Machine Learning.
5. In the Machine Learning pane, select Create to begin.

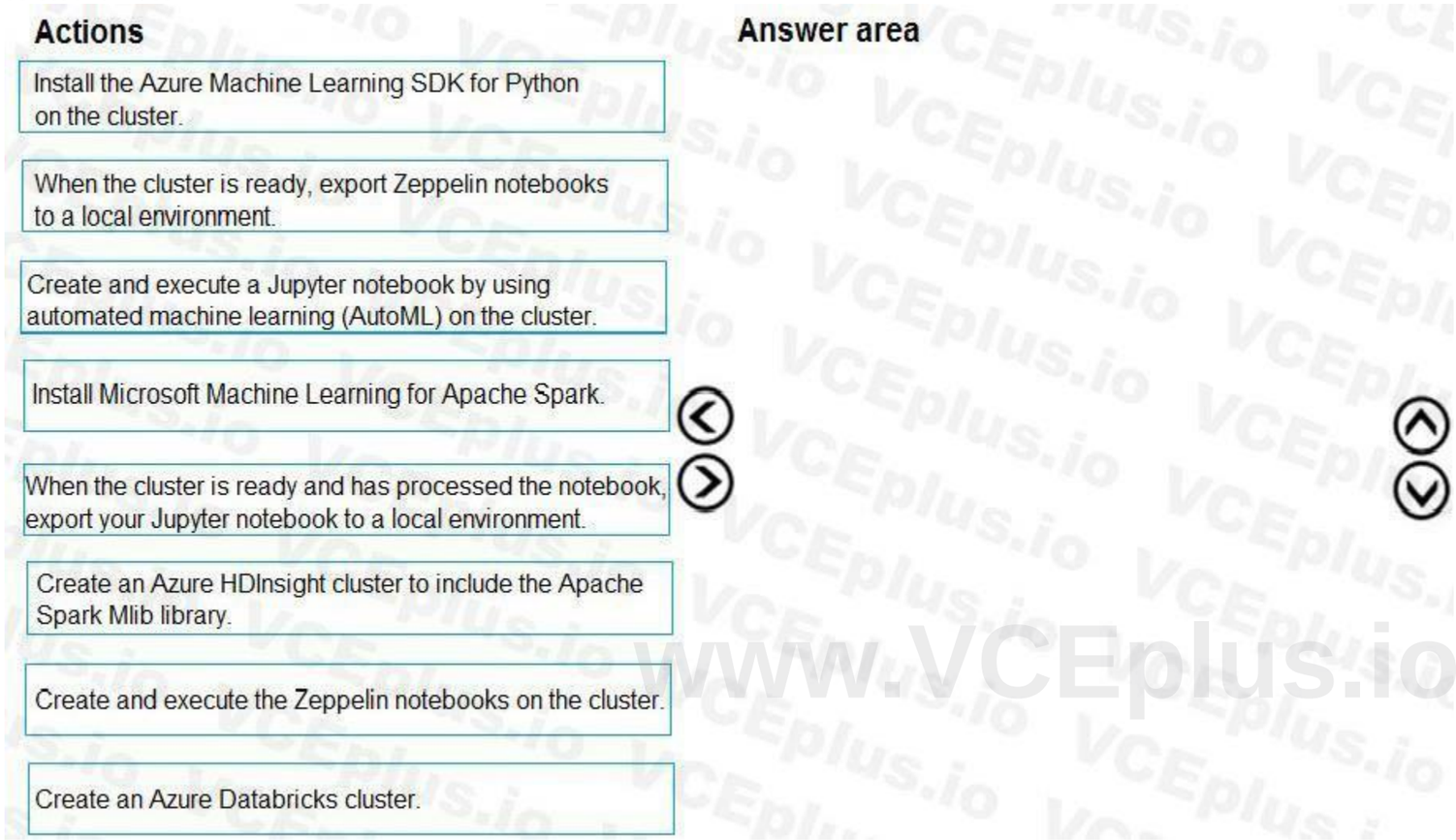


Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-workspace-template
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-manage-workspace-cli
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-manage-workspace

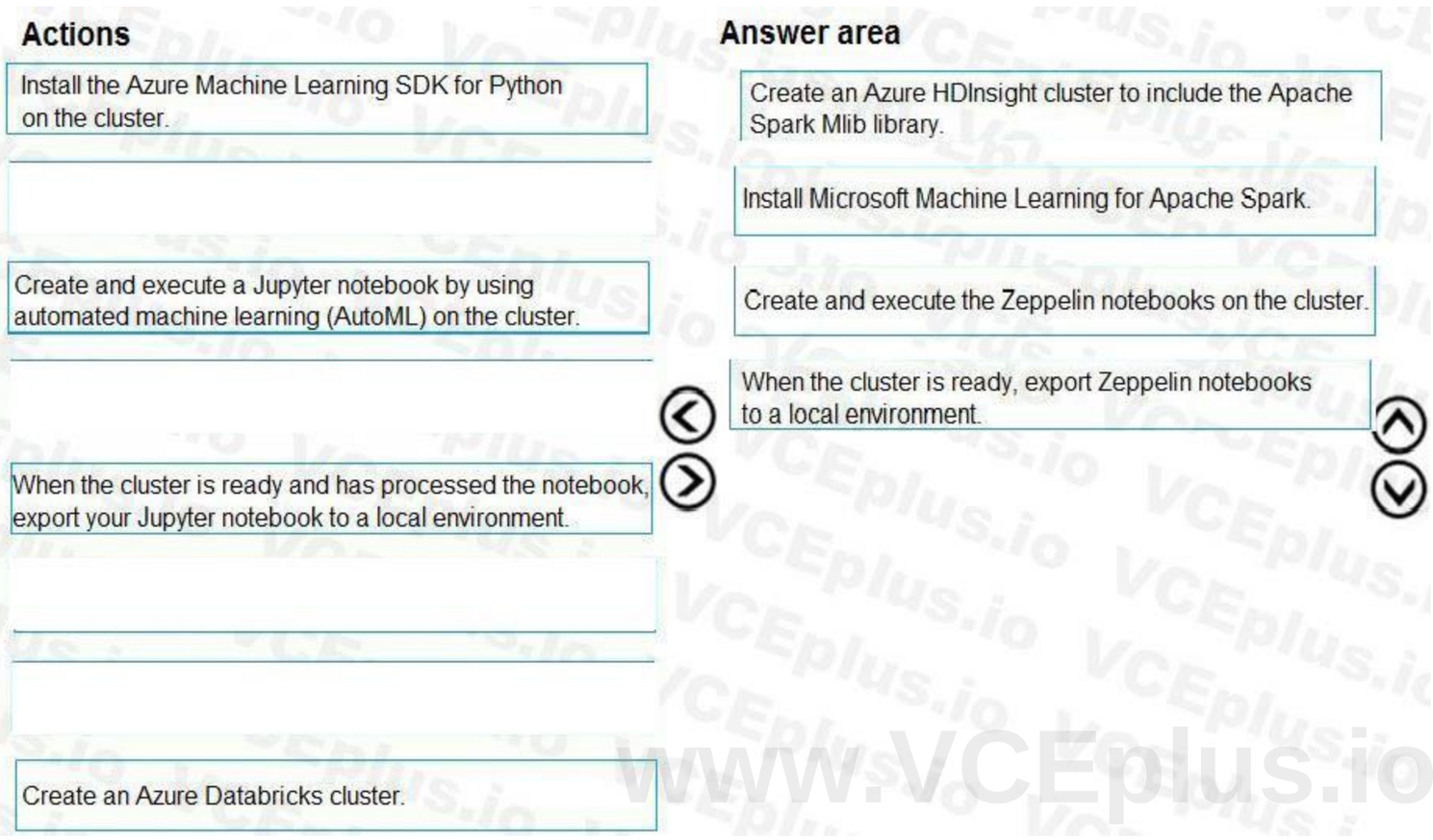
QUESTION 36
DRAG DROP
You are building an intelligent solution using machine learning models.
The environment must support the following requirements:
Data scientists must build notebooks in a cloud environment
Data scientists must use automatic feature engineering and model building in machine learning pipelines.
Notebooks must be deployed to retrain using Spark instances with dynamic worker allocation.
Notebooks must be exportable to be version controlled locally.
You need to create the environment.

Which four actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



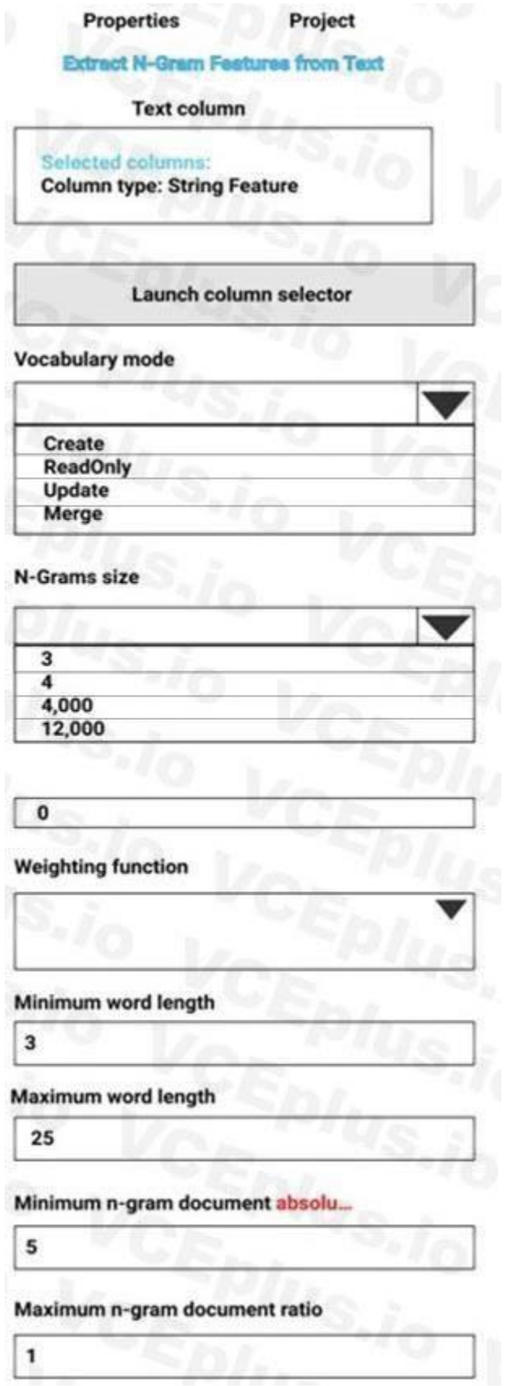
Correct Answer:



Section:
Explanation:
Step 1: Create an Azure HDInsight cluster to include the Apache Spark Mlib library
Step 2: Install Microsot Machine Learning for Apache Spark
You install AzureML on your Azure HDInsight cluster.
Microsoft Machine Learning for Apache Spark (MMLSpark) provides a number of deep learning and data science tools for Apache Spark, including seamless integration of Spark Machine Learning pipelines with Microsoft Cognitive Toolkit (CNTK) and OpenCV, enabling you to quickly create powerful, highly-scalable predictive and analytical models for large image and text datasets.
Step 3: Create and execute the Zeppelin notebooks on the cluster
Step 4: When the cluster is ready, export Zeppelin notebooks to a local environment.
Notebooks must be exportable to be version controlled locally.
References:
https://docs.microsoft.com/en-us/azure/hdinsight/spark/apache-spark-zeppelin-notebook
https://azuremlbuild.blob.core.windows.net/pysparkapi/intro.html

QUESTION 37
HOTSPOT
You are performing sentiment analysis using a CSV file that includes 12,000 customer reviews written in a short sentence format. You add the CSV file to Azure Machine Learning Studio and configure it as the starting point dataset of an experiment. You add the Extract N-Gram Features from Text module to the experiment to extract key phrases from the customer review column in the dataset.
You must create a new n-gram dictionary from the customer review text and set the maximum n-gram size to trigrams.
What should you select? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



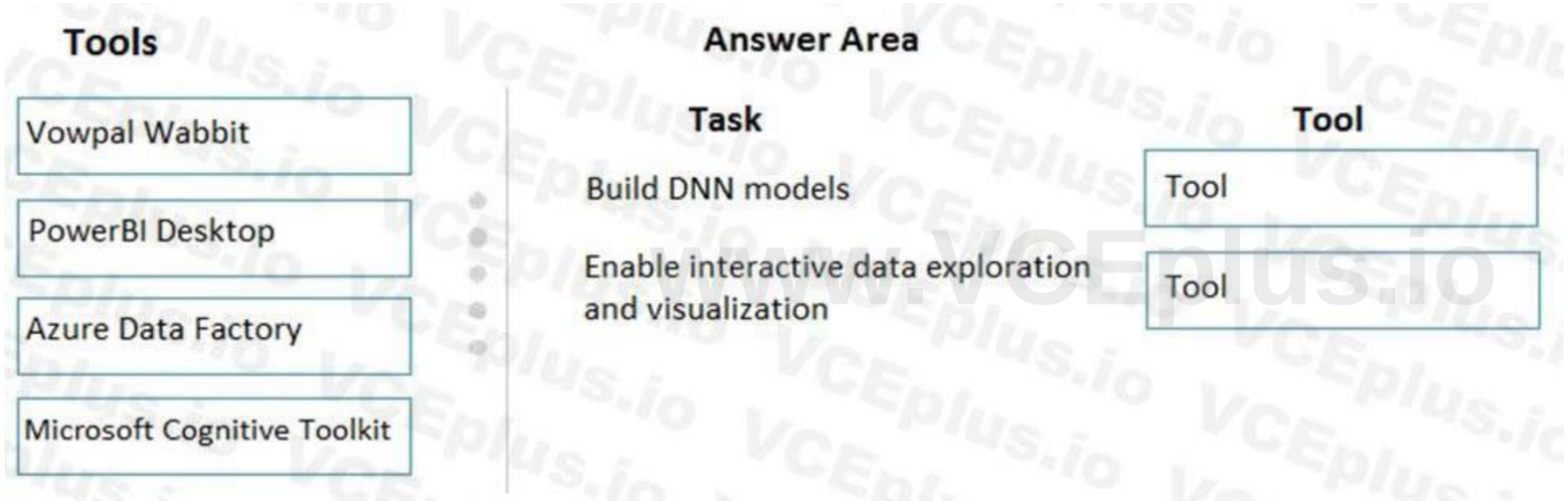
Answer Area:

Section:
Explanation:
Vocabulary mode: Create
For Vocabulary mode, select Create to indicate that you are creating a new list of n-gram features.
N-Grams size: 3 For N-Grams size, type a number that indicates the maximum size of the n-grams to extract and store. For example, if you type 3, unigrams, bigrams, and trigrams will be created.

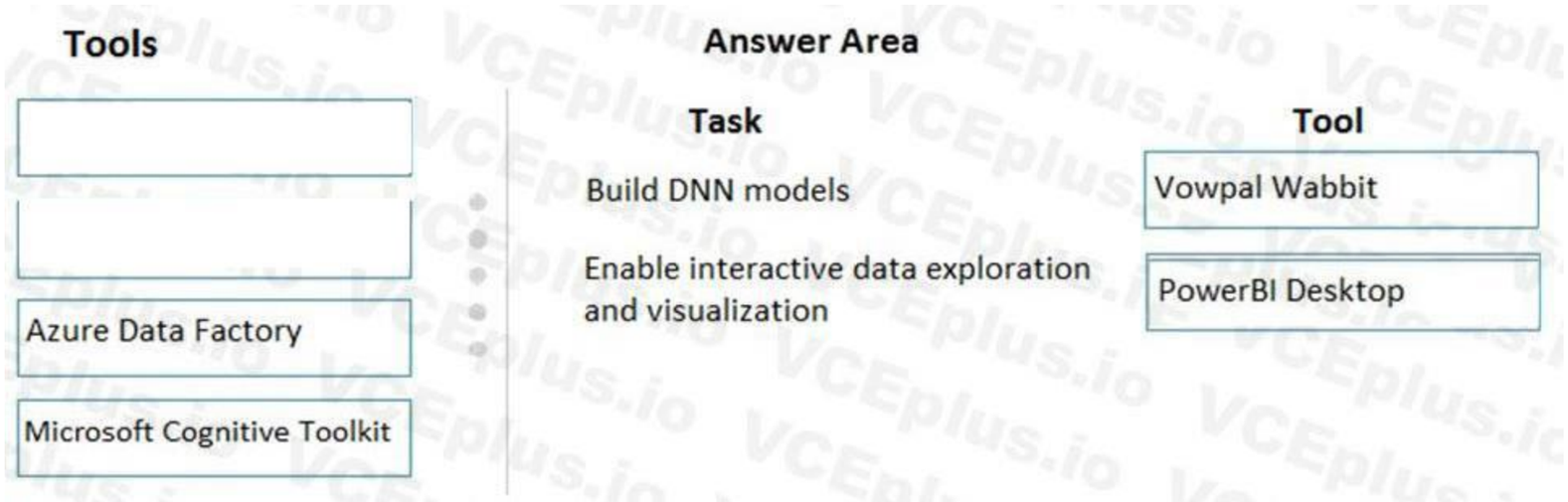
Weighting function: Leave blank The option, Weighting function, is required only if you merge or update vocabularies. It specifies how terms in the two vocabularies and their scores should be weighted against each other.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/extract-n-gram-features-from-text

QUESTION 38
DRAG DROP
You configure a Deep Learning Virtual Machine for Windows.
You need to recommend tools and frameworks to perform the following:
Build deep neural network (DNN) models
Perform interactive data exploration and visualization
Which tools and frameworks should you recommend? To answer, drag the appropriate tools to the correct tasks. Each tool may be used once, more than once, or not at all. You may need to drag the split bar between panes or scroll to view content.
NOTE: Each correct selection is worth one point.

Select and Place:



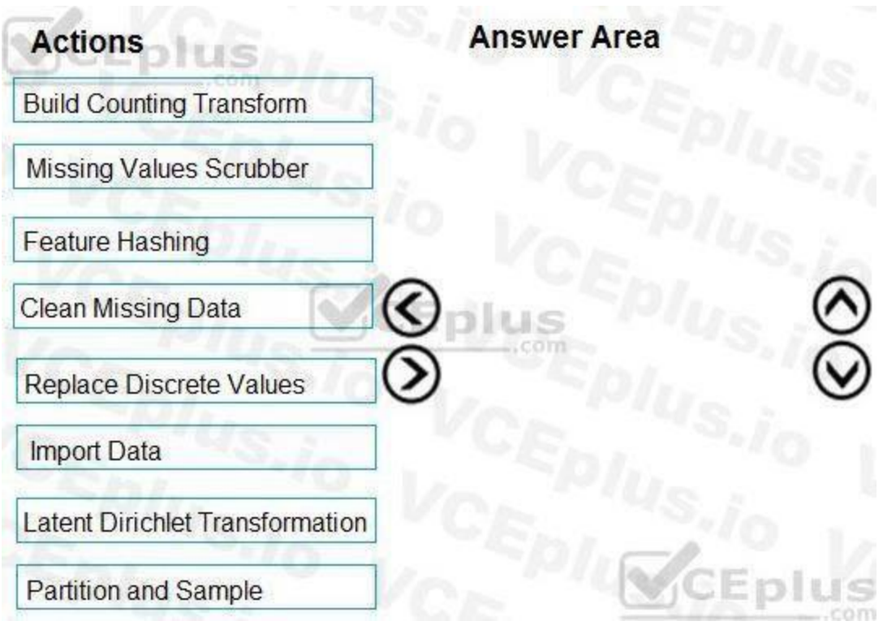
Correct Answer:



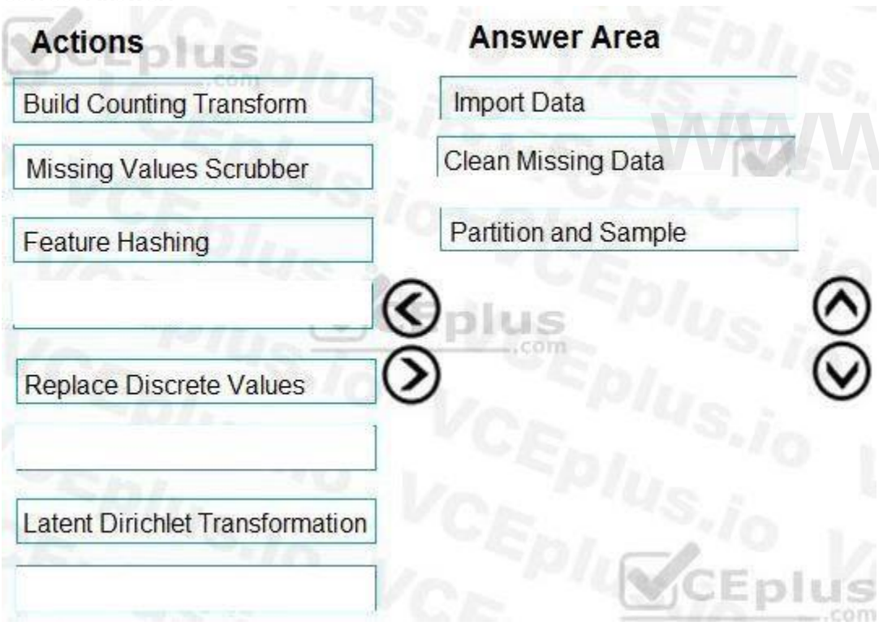
Section:
Explanation:
Box 1: Vowpal Wabbit
Use the Train Vowpal Wabbit Version 8 module in Azure Machine Learning Studio (classic), to create a machine learning model by using Vowpal Wabbit.
Box 2: PowerBI Desktop
Power BI Desktop is a powerful visual data exploration and interactive reporting tool BI is a name given to a modern approach to business decision making in which users are empowered to find, explore, and share insights from data across the enterprise.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/train-vowpal-wabbit-version-8-model
https://docs.microsoft.com/en-us/azure/architecture/data-guide/scenarios/interactive-data-exploration

QUESTION 39
DRAG DROP
You are creating an experiment by using Azure Machine Learning Studio.
You must divide the data into four subsets for evaluation. There is a high degree of missing values in the data. You must prepare the data for analysis.
You need to select appropriate methods for producing the experiment.
Which three modules should you run in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.
NOTE: More than one order of answer choices is correct. You will receive credit for any of the correct orders you select.

Select and Place:



Correct Answer:



Section:

Explanation:

The Clean Missing Data module in Azure Machine Learning Studio, to remove, replace, or infer missing values.

Incorrect Answers:

Latent Direchlet Transformation: Latent Dirichlet Allocation module in Azure Machine Learning Studio, to group otherwise unclassified text into a number of categories. Latent Dirichlet Allocation (LDA) is often used in natural language processing (NLP) to find texts that are similar. Another common term is topic modeling.

Build Counting Transform: Build Counting Transform module in Azure Machine Learning Studio, to analyze training data. From this data, the module builds a count table as well as a set of count-based features that can be used in a predictive model.

Missing Value Scrubber: The Missing Values Scrubber module is deprecated.
Feature hashing: Feature hashing is used for linguistics, and works by converting unique tokens into integers.
Replace discrete values: the Replace Discrete Values module in Azure Machine Learning Studio is used to generate a probability score that can be used to represent a discrete value. This score can be useful for understanding the information value of the discrete values.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

01 - Run experiments and train models

QUESTION 1
You are analyzing a dataset containing historical data from a local taxi company. You are developing a regression model.
You must predict the fare of a taxi trip.
You need to select performance metrics to correctly evaluate the regression model.
Which two metrics can you use? Each correct answer presents a complete solution?
NOTE: Each correct selection is worth one point.

A. a Root Mean Square Error value that is low
B. an R-Squared value close to 0
C. an F1 score that is low
D. an R-Squared value close to 1
E. an F1 score that is high
F. a Root Mean Square Error value that is high

Correct Answer: A, D
Section:
Explanation:
RMSE and R2 are both metrics for regression models.
A: Root mean squared error (RMSE) creates a single value that summarizes the error in the model. By squaring the difference, the metric disregards the difference between over-prediction and under-prediction.
D: Coefficient of determination, often referred to as R2, represents the predictive power of the model as a value between 0 and 1. Zero means the model is random (explains nothing); 1 means there is a perfect fit. However, caution should be used in interpreting R2 values, as low values can be entirely normal and high values can be suspect.
Incorrect Answers:
C, E: F-score is used for classification models, not for regression models.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/evaluate-model

QUESTION 2
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are using Azure Machine Learning to run an experiment that trains a classification model.
You want to use Hyperdrive to find parameters that optimize the AUC metric for the model. You configure a HyperDriveConfig for the experiment by running the following code:

```
hyperdrive = HyperDriveConfig(estimator=your_estimator,
 hyperparameter_sampling=your_params,
 policy=policy,
 primary_metric_name='AUC',
 primary_metric_goal=PrimaryMetricGoal.MAXIMIZE,
 max_total_runs=6,
 max_concurrent_runs=4)
```

You plan to use this configuration to run a script that trains a random forest model and then tests it with validation data. The label values for the validation data are stored in a variable named y_test variable, and the predicted probabilities from the model are stored in a variable named y_predicted.
You need to add logging to the script to allow Hyperdrive to optimize hyperparameters for the AUC metric.
Solution: Run the following code:

```
from sklearn.metrics import roc_auc_score
import logging
# code to train model omitted
auc = roc_auc_score(y_test, y_predicted)
logging.info("AUC: " + str(auc))
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
Python printing/logging example: logging.info(message)
Destination: Driver logs, Azure Machine Learning designer
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-debug-pipelines

QUESTION 3
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are using Azure Machine Learning to run an experiment that trains a classification model.
You want to use Hyperdrive to find parameters that optimize the AUC metric for the model. You configure a HyperDriveConfig for the experiment by running the following code:

```
hyperdrive = HyperDriveConfig(estimator=your_estimator,
 hyperparameter_sampling=your_params,
 policy=policy,
 primary_metric_name='AUC',
 primary_metric_goal=PrimaryMetricGoal.MAXIMIZE,
 max_total_runs=6,
 max_concurrent_runs=4)
```

You plan to use this configuration to run a script that trains a random forest model and then tests it with validation data. The label values for the validation data are stored in a variable named y_test variable, and the predicted probabilities from the model are stored in a variable named y_predicted.
You need to add logging to the script to allow Hyperdrive to optimize hyperparameters for the AUC metric.
Solution: Run the following code:

```
import json, os
from sklearn.metrics import roc_auc_score
# code to train model omitted
auc = roc_auc_score(y_test, y_predicted)
os.makedirs("outputs", exist_ok = True)
with open("outputs/AUC.txt", "w") as file_cur:
   file_cur.write(auc)
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use a solution with logging.info(message) instead.
Note: Python printing/logging example: logging.info(message)
Destination: Driver logs, Azure Machine Learning designer
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-debug-pipelines

QUESTION 4
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are using Azure Machine Learning to run an experiment that trains a classification model.
You want to use Hyperdrive to find parameters that optimize the AUC metric for the model. You configure a HyperDriveConfig for the experiment by running the following code:

```
hyperdrive = HyperDriveConfig(estimator=your_estimator,
 hyperparameter_sampling=your_params,
 policy=policy,
 primary_metric_name='AUC',
 primary_metric_goal=PrimaryMetricGoal.MAXIMIZE,
 max_total_runs=6,
 max_concurrent_runs=4)
```

You plan to use this configuration to run a script that trains a random forest model and then tests it with validation data. The label values for the validation data are stored in a variable named y_test variable, and the predicted probabilities from the model are stored in a variable named y_predicted.
You need to add logging to the script to allow Hyperdrive to optimize hyperparameters for the AUC metric.
Solution: Run the following code:

```
import numpy as np
from sklearn.metrics import roc_auc_score
# code to train model omitted
auc = roc_auc_score(y_test, y_predicted)
print(np.float(auc))
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use a solution with logging.info(message) instead.
Note: Python printing/logging example: logging.info(message)
Destination: Driver logs, Azure Machine Learning designer
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-debug-pipelines

QUESTION 5
You use the following code to run a script as an experiment in Azure Machine Learning:

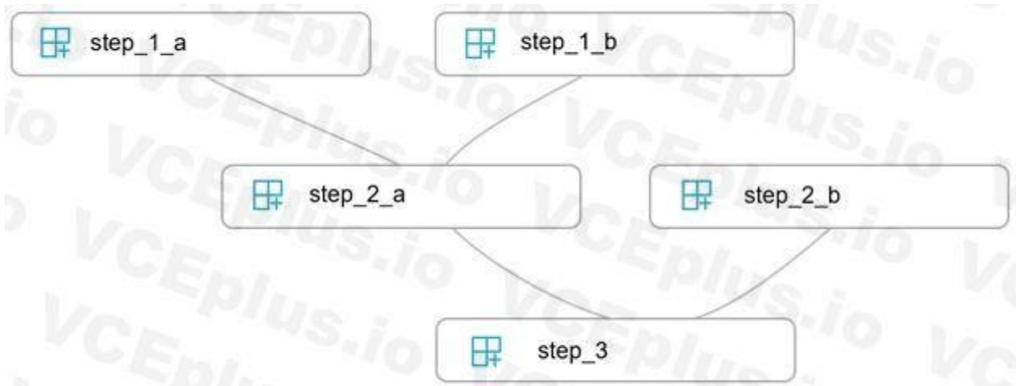
```
from azureml.core import Workspace, Experiment, Run
from azureml.core import RunConfig, ScriptRunConfig
ws = Workspace.from_config()
run_config = RunConfiguration()
run_config.target='local'
script_config = ScriptRunConfig(source_directory='./script', script='experiment.py', run_config=run_config)
experiment = Experiment(workspace=ws, name='script experiment')
run = experiment.submit(config=script_config)
run.wait_for_completion()
```

You must identify the output files that are generated by the experiment run.
You need to add code to retrieve the output file names.
Which code segment should you add to the script?

A. files = run.get_properties()
B. files= run.get_file_names()
C. files = run.get_details_with_logs()
D. files = run.get_metrics()
E. files = run.get_details()

Correct Answer: B
Section:
Explanation:
You can list all of the files that are associated with this run record by called run.get_file_names()
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-track-experiments

QUESTION 6
You write five Python scripts that must be processed in the order specified in Exhibit A – which allows the same modules to run in parallel, but will wait for modules with dependencies.
You must create an Azure Machine Learning pipeline using the Python SDK, because you want to script to create the pipeline to be tracked in your version control system. You have created five PythonScriptSteps and have named the variables to match the module names.



You need to create the pipeline shown. Assume all relevant imports have been done.
Which Python code segment should you use?

A.
```
p = Pipeline(ws, steps=[[[[step_1_a, step_1_b], step_2_a],  step_2_b], step_3])
```

B.
```
pipeline_steps = {
    "Pipeline": {
        "run": step_3,
        "run_after": {[
            {"run": step_2_a,
              "run_after":
                [{"run": step_1_a},
                 {"run": step_1_b}]
            },
          {"run": step_2_b}]
        }
    }
}
p = Pipeline(ws, steps=pipeline_steps)
```

C.
```
step_2_a.run_after(step_1_b)
step_2_a.run_after(step_1_a)
step_3.run_after(step_2_b)
step_3.run_after(step_2_a)
p = Pipeline(ws, steps=[step_3])
```

D.
```
p = Pipeline(ws, steps=[step_1_a, step_1_b, step_2_a, step_2_b, step_3])
```

Correct Answer: A
Section:
Explanation:

The steps parameter is an array of steps. To build pipelines that have multiple steps, place the steps in order in this array.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-use-parallel-run-step

QUESTION 7
You create a datastore named training_data that references a blob container in an Azure Storage account. The blob container contains a folder named csv_files in which multiple comma-separated values (CSV) files are stored.
You have a script named train.py in a local folder named ./script that you plan to run as an experiment using an estimator. The script includes the following code to read data from the csv_files folder:

```
import os
import argparse
import pandas as pd

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from azureml.core import Run

run = Run.get_context()
parser = argparse.ArgumentParser()
parser.add_argument('--data-folder', type=str, dest='data_folder', help='data reference')
args = parser.parse_args()

data_folder = args.data_folder
csv_files = os.listdir(data_folder)
training_data = pd.concat((pd.read_csv(os.path.join(data_folder,csv_file)) for csv_file in csv_files))

# Code goes on to split the training data and train a logistic regression model
```

You have the following script.

```
from azureml.core import Workspace, Datastore, Experiment
from azureml.train.sklearn import SKLearn

ws = Workspace.from_config()
exp = Experiment(workspace=ws, name='csv_training')
ds = Datastore.get(ws, datastore_name='training_data')
data_ref = ds.path('csv_files')

# Code to define estimator goes here

run = exp.submit(config=estimator)
run.wait_for_completion(show_output=True)
```

You need to configure the estimator for the experiment so that the script can read the data from a data reference named data_ref that references the csv_files folder in the training_data datastore.
Which code should you use to configure the estimator?

A.

```
estimator = SKLearn(source_directory='./script',
 inputs=[data_ref.as_named_input('data-folder').to_pandas_dataframe()],
 compute_target='local',
 entry_script='train.py')
```

B.

```
script_params = {
   '--data-folder': data_ref.as_mount()
}
estimator = SKLearn(source_directory='./script',
 script_params=script_params,
 compute_target='local',
 entry_script='train.py'
```

C.

```
estimator = SKLearn(source_directory='./script',
 inputs=[data_ref.as_named_input('data-folder').as_mount()],
 compute_target='local',
 entry_script='train.py')
```

D.

```
script_params = {
    '--data-folder': data_ref.as_download(path_on_compute='csv_files')
}
estimator = SKLearn(source_directory='./script',
 script_params=script_params,
 compute_target='local',
 entry_script='train.py'
```

E.

```
estimator = SKLearn(source_directory='./script',
 inputs=[data_ref.as_named_input('data-folder').as_download(path_on_compute='csv_files')],
 compute_target='local',
 entry_script='train.py')
```

Correct Answer: B
Section:
Explanation:
Besides passing the dataset through the input parameters in the estimator, you can also pass the dataset through script_params and get the data path (mounting point) in your training script via arguments. This way, you can keep your training script independent of azureml-sdk. In other words, you will be able use the same training script for local debugging and remote training on any cloud platform.
Example:
from azureml.train.sklearn import SKLearn
script_params = {
# mount the dataset on the remote compute and pass the mounted path as an argument to the training script
'--data-folder': mnist_ds.as_named_input('mnist').as_mount(),
'--regularization': 0.5
}
est = SKLearn(source_directory=script_folder,
script_params=script_params,
compute_target=compute_target,
environment_definition=env,
entry_script='train_mnist.py')
# Run the experiment

run = experiment.submit(est)
run.wait_for_completion(show_output=True)
Incorrect Answers:
A: Pandas DataFrame not used.
Reference:
https://docs.microsoft.com/es-es/azure/machine-learning/how-to-train-with-datasets

QUESTION 8
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
An IT department creates the following Azure resource groups and resources:

Resource group	Resources
ml_resources	• an Azure Machine Learning workspace named amlworkspace • an Azure Storage account named amlworkspace12345 • an Application Insights instance named amlworkspace54321 • an Azure Key Vault named amlworkspace67890 • an Azure Container Registry named amlworkspace09876
general_compute	A virtual machine named mlvm with the following configuration: • Operating system: Ubuntu Linux • Software installed: Python 3.6 and Jupyter Notebooks • Size: NC6 (6 vCPUs, 1 vGPU, 56 Gb RAM)

The IT department creates an Azure Kubernetes Service (AKS)-based inference compute target named aks-cluster in the Azure Machine Learning workspace.
You have a Microsoft Surface Book computer with a GPU. Python 3.6 and Visual Studio Code are installed.
You need to run a script that trains a deep neural network (DNN) model and logs the loss and accuracy metrics.
Solution: Attach the mlvm virtual machine as a compute target in the Azure Machine Learning workspace. Install the Azure ML SDK on the Surface Book and run Python code to connect to the workspace. Run the training script as an experiment on the mlvm remote compute resource.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
Use the VM as a compute target.
Note: A compute target is a designated compute resource/environment where you run your training script or host your service deployment. This location may be your local machine or a cloud-based compute resource.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/concept-compute-target

QUESTION 9
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
An IT department creates the following Azure resource groups and resources:

Resource group	Resources
ml_resources	• an Azure Machine Learning workspace named amlworkspace • an Azure Storage account named amlworkspace12345 • an Application Insights instance named amlworkspace54321 • an Azure Key Vault named amlworkspace67890 • an Azure Container Registry named amlworkspace09876
general_compute	A virtual machine named mlvm with the following configuration: • Operating system: Ubuntu Linux • Software installed: Python 3.6 and Jupyter Notebooks • Size: NC6 (6 vCPUs, 1 vGPU, 56 Gb RAM)

The IT department creates an Azure Kubernetes Service (AKS)-based inference compute target named aks-cluster in the Azure Machine Learning workspace.
You have a Microsoft Surface Book computer with a GPU. Python 3.6 and Visual Studio Code are installed.
You need to run a script that trains a deep neural network (DNN) model and logs the loss and accuracy metrics.
Solution: Install the Azure ML SDK on the Surface Book. Run Python code to connect to the workspace and then run the training script as an experiment on local compute.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Need to attach the mlvm virtual machine as a compute target in the Azure Machine Learning workspace.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/concept-compute-target

QUESTION 10
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
An IT department creates the following Azure resource groups and resources:

Resource group	Resources
ml_resources	• an Azure Machine Learning workspace named amlworkspace • an Azure Storage account named amlworkspace12345 • an Application Insights instance named amlworkspace54321 • an Azure Key Vault named amlworkspace67890 • an Azure Container Registry named amlworkspace09876
general_compute	A virtual machine named mlvm with the following configuration: • Operating system: Ubuntu Linux • Software installed: Python 3.6 and Jupyter Notebooks • Size: NC6 (6 vCPUs, 1 vGPU, 56 Gb RAM)

The IT department creates an Azure Kubernetes Service (AKS)-based inference compute target named aks-cluster in the Azure Machine Learning workspace.
You have a Microsoft Surface Book computer with a GPU. Python 3.6 and Visual Studio Code are installed.
You need to run a script that trains a deep neural network (DNN) model and logs the loss and accuracy metrics.
Solution: Install the Azure ML SDK on the Surface Book. Run Python code to connect to the workspace. Run the training script as an experiment on the aks-cluster compute target.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Need to attach the mlvm virtual machine as a compute target in the Azure Machine Learning workspace.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/concept-compute-target

QUESTION 11
You create a batch inference pipeline by using the Azure ML SDK. You configure the pipeline parameters by executing the following code:

```
from azureml.contrib.pipeline.steps import ParallelRunConfig
parallel_run_config = ParallelRunConfig(
    source_directory=scripts_folder,
    entry_script= "batch_pipeline.py",
    mini_batch_size= "5",
    error_threshold=10,
    output_action= "append_row",
    environment=batch_env,
    compute_target=compute_target,
    logging_level= "DEBUG",
    node_count=4)
```

You need to obtain the output from the pipeline execution.
Where will you find the output?

A. the digit_identification.py script
B. the debug log
C. the Activity Log in the Azure portal for the Machine Learning workspace
D. the Inference Clusters tab in Machine Learning studio
E. a file named parallel_run_step.txt located in the output folder

Correct Answer: E
Section:
Explanation:
output_action (str): How the output is to be organized. Currently supported values are 'append_row' and 'summary_only'.
'append_row' - All values output by run() method invocations will be aggregated into one unique file named parallel_run_step.txt that is created in the output location. 'summary_only'
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-contrib-pipeline-steps/azureml.contrib.pipeline.steps.parallelrunconfig

QUESTION 12
You plan to run a script as an experiment using a Script Run Configuration. The script uses modules from the scipy library as well as several Python packages that are not typically installed in a default conda environment.
You plan to run the experiment on your local workstation for small datasets and scale out the experiment by running it on more powerful remote compute clusters for larger datasets.
You need to ensure that the experiment runs successfully on local and remote compute with the least administrative effort.
What should you do?

A. Do not specify an environment in the run configuration for the experiment. Run the experiment by using the default environment.
B. Create a virtual machine (VM) with the required Python configuration and attach the VM as a compute target. Use this compute target for all experiment runs.

C. Create and register an Environment that includes the required packages. Use this Environment for all experiment runs.
D. Create a config.yaml file defining the conda packages that are required and save the file in the experiment folder.
E. Always run the experiment with an Estimator by using the default packages.

Correct Answer: C
Section:
Explanation:
If you have an existing Conda environment on your local computer, then you can use the service to create an environment object. By using this strategy, you can reuse your local interactive environment on remote runs.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-use-environments

QUESTION 13
You write a Python script that processes data in a comma-separated values (CSV) file.
You plan to run this script as an Azure Machine Learning experiment.
The script loads the data and determines the number of rows it contains using the following code:

```
from azureml.core import Run
import pandas as pd

run = Run.get_context()
data = pd.read_csv('./data.csv')
rows = (len(data))
# record row_count metric here
…
```

You need to record the row count as a metric named row_count that can be returned using the get_metrics method of the Run object after the experiment run completes.
Which code should you use?

A. run.upload_file(T3 row_count', './data.csv')
B. run.log('row_count', rows)
C. run.tag('row_count', rows)
D. run.log_table('row_count', rows)
E. run.log_row('row_count', rows)

Correct Answer: B
Section:
Explanation:
Log a numerical or string value to the run with the given name using log(name, value, description=''). Logging a metric to a run causes that metric to be stored in the run record in the experiment. You can log the same metric multiple times within a run, the result being considered a vector of that metric.
Example: run.log("accuracy", 0.95)
Incorrect Answers:
E: Using log_row(name, description=None, **kwargs) creates a metric with multiple columns as described in kwargs. Each named parameter generates a column with the value specified. log_row can be called once to log an arbitrary tuple, or multiple times in a loop to generate a complete table.
Example: run.log_row("Y over X", x=1, y=0.4)
Reference: https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.run

QUESTION 14
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.

After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are creating a new experiment in Azure Machine Learning Studio.
One class has a much smaller number of observations than the other classes in the training set.
You need to select an appropriate data sampling strategy to compensate for the class imbalance.
Solution: You use the Synthetic Minority Oversampling Technique (SMOTE) sampling mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
SMOTE is used to increase the number of underepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote

QUESTION 15
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are creating a new experiment in Azure Machine Learning Studio.
One class has a much smaller number of observations than the other classes in the training set.
You need to select an appropriate data sampling strategy to compensate for the class imbalance.
Solution: You use the Stratified split for the sampling mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Instead use the Synthetic Minority Oversampling Technique (SMOTE) sampling mode.
Note: SMOTE is used to increase the number of underepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote

QUESTION 16
You are creating a machine learning model.
You need to identify outliers in the data.
Which two visualizations can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Venn diagram
B. Box plot
C. ROC curve
D. Random forest diagram

E. Scatter plot

Correct Answer: B, E
Section:
Explanation:
The box-plot algorithm can be used to display outliers.
One other way to quickly identify Outliers visually is to create scatter plots.
Reference:
https://blogs.msdn.microsoft.com/azuredev/2017/05/27/data-cleansing-tools-in-azure-machine-learning/

QUESTION 17
You are evaluating a completed binary classification machine learning model.
You need to use the precision as the evaluation metric.
Which visualization should you use?

A. Violin plot
B. Gradient descent
C. Box plot
D. Binary classification confusion matrix

Correct Answer: D
Section:
Explanation:
Incorrect Answers:
A: A violin plot is a visual that traditionally combines a box plot and a kernel density plot.
B: Gradient descent is a first-order iterative optimization algorithm for finding the minimum of a function. To find a local minimum of a function using gradient descent, one takes steps proportional to the negative of the gradient (or approximate gradient) of the function at the current point.
C: A box plot lets you see basic distribution information about your data, such as median, mean, range and quartiles but doesn't show you how your data looks throughout its range.
Reference:
https://machinelearningknowledge.ai/confusion-matrix-and-performance-metrics-machine-learning/

QUESTION 18
You create a multi-class image classification deep learning model that uses the PyTorch deep learning framework.
You must configure Azure Machine Learning Hyperdrive to optimize the hyperparameters for the classification model.
You need to define a primary metric to determine the hyperparameter values that result in the model with the best accuracy score.
Which three actions must you perform? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Set the primary_metric_goal of the estimator used to run the bird_classifier_train.py script to maximize.
B. Add code to the bird_classifier_train.py script to calculate the validation loss of the model and log it as a float value with the key loss.
C. Set the primary_metric_goal of the estimator used to run the bird_classifier_train.py script to minimize.
D. Set the primary_metric_name of the estimator used to run the bird_classifier_train.py script to accuracy.
E. Set the primary_metric_name of the estimator used to run the bird_classifier_train.py script to loss.
F. Add code to the bird_classifier_train.py script to calculate the validation accuracy of the model and log it as a float value with the key accuracy.

Correct Answer: A, D, F

Section:
Explanation:
AD:
primary_metric_name="accuracy", primary_metric_goal=PrimaryMetricGoal.MAXIMIZE Optimize the runs to maximize "accuracy". Make sure to log this value in your training script. Note: primary_metric_name: The name of the primary metric to optimize. The name of the primary metric needs to exactly match the name of the metric logged by the training script. primary_metric_goal: It can be either PrimaryMetricGoal.MAXIMIZE or PrimaryMetricGoal.MINIMIZE and determines whether the primary metric will be maximized or minimized when evaluating the runs.
F: The training script calculates the val_accuracy and logs it as "accuracy", which is used as the primary metric.

QUESTION 19
You are performing a filter-based feature selection for a dataset to build a multi-class classifier by using Azure Machine Learning Studio.
The dataset contains categorical features that are highly correlated to the output label column.
You need to select the appropriate feature scoring statistical method to identify the key predictors.
Which method should you use?

A. Kendall correlation
B. Spearman correlation
C. Chi-squared
D. Pearson correlation

Correct Answer: D
Section:
Explanation:
Pearson's correlation statistic, or Pearson's correlation coefficient, is also known in statistical models as the r value. For any two variables, it returns a value that indicates the strength of the correlation Pearson's correlation coefficient is the test statistics that measures the statistical relationship, or association, between two continuous variables. It is known as the best method of measuring the association between variables of interest because it is based on the method of covariance. It gives information about the magnitude of the association, or correlation, as well as the direction of the relationship.
Incorrect Answers:
C: The two-way chi-squared test is a statistical method that measures how close expected values are to actual results.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/filter-based-feature-selection https://www.statisticssolutions.com/pearsons-correlation-coefficient/

QUESTION 20
You plan to use automated machine learning to train a regression model. You have data that has features which have missing values, and categorical features with few distinct values.
You need to configure automated machine learning to automatically impute missing values and encode categorical features as part of the training task.
Which parameter and value pair should you use in the AutoMLConfig class?

A. featurization = 'auto'
B. enable_voting_ensemble = True
C. task = 'classification'
D. exclude_nan_labels = True
E. enable_tf = True

Correct Answer: A
Section:
Explanation:
Featurization str or FeaturizationConfig
Values: 'auto' / 'off' / FeaturizationConfig
Indicator for whether featurization step should be done automatically or not, or whether customized featurization should be used.

Column type is automatically detected. Based on the detected column type preprocessing/featurization is done as follows:
Categorical: Target encoding, one hot encoding, drop high cardinality categories, impute missing values.
Numeric: Impute missing values, cluster distance, weight of evidence.
DateTime: Several features such as day, seconds, minutes, hours etc.
Text: Bag of words, pre-trained Word embedding, text target encoding.
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-train-automl-client/azureml.train.automl.automlconfig.automlconfig

QUESTION 21
You are building a regression model for estimating the number of calls during an event.
You need to determine whether the feature values achieve the conditions to build a Poisson regression model.
Which two conditions must the feature set contain? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. The label data must be a negative value.
B. The label data must be whole numbers.
C. The label data must be non-discrete.
D. The label data must be a positive value.
E. The label data can be positive or negative.

Correct Answer: B, D
Section:
Explanation:
Poisson regression is intended for use in regression models that are used to predict numeric values, typically counts. Therefore, you should use this module to create your regression model only if the values you are trying to predict fit the following conditions:
The response variable has a Poisson distribution.
Counts cannot be negative. The method will fail outright if you attempt to use it with negative labels.
A Poisson distribution is a discrete distribution; therefore, it is not meaningful to use this method with non-whole numbers.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/poisson-regression

QUESTION 22
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You are creating a new experiment in Azure Machine Learning Studio.
One class has a much smaller number of observations than the other classes in the training set.
You need to select an appropriate data sampling strategy to compensate for the class imbalance.
Solution: You use the Principal Components Analysis (PCA) sampling mode.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:

Instead use the Synthetic Minority Oversampling Technique (SMOTE) sampling mode.
Note: SMOTE is used to increase the number of underepresented cases in a dataset used for machine learning. SMOTE is a better way of increasing the number of rare cases than simply duplicating existing cases.
Incorrect Answers:
The Principal Component Analysis module in Azure Machine Learning Studio (classic) is used to reduce the dimensionality of your training data. The module analyzes your data and creates a reduced feature set that captures all the information contained in the dataset, but in a smaller number of features.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/principal-component-analysis

QUESTION 23
You are performing feature engineering on a dataset.
You must add a feature named CityName and populate the column value with the text London.
You need to add the new feature to the dataset.
Which Azure Machine Learning Studio module should you use?

A. Edit Metadata
B. Filter Based Feature Selection
C. Execute Python Script
D. Latent Dirichlet Allocation

Correct Answer: A
Section:
Explanation:
Typical metadata changes might include marking columns as features.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/edit-metadata

QUESTION 24
You are evaluating a completed binary classification machine learning model.
You need to use the precision as the evaluation metric.
Which visualization should you use?

A. violin plot
B. Gradient descent
C. Scatter plot
D. Receiver Operating Characteristic (ROC) curve

Correct Answer: D
Section:
Explanation:
Receiver operating characteristic (or ROC) is a plot of the correctly classified labels vs. the incorrectly classified labels for a particular model.
Incorrect Answers:
A: A violin plot is a visual that traditionally combines a box plot and a kernel density plot.
B: Gradient descent is a first-order iterative optimization algorithm for finding the minimum of a function. To find a local minimum of a function using gradient descent, one takes steps proportional to the negative of the gradient (or approximate gradient) of the function at the current point.
C: A scatter plot graphs the actual values in your data against the values predicted by the model. The scatter plot displays the actual values along the X-axis, and displays the predicted values along the Y-axis. It also displays a line that illustrates the perfect prediction, where the predicted value exactly matches the actual value.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-understand-automated-ml#confusion-matrix

QUESTION 25
You are solving a classification task.
You must evaluate your model on a limited data sample by using k-fold cross-validation. You start by configuring a k parameter as the number of splits.
You need to configure the k parameter for the cross-validation.
Which value should you use?

A. k=1
B. k=10
C. k=0.5
D. k=0.9

Correct Answer: B
Section:
Explanation:
Leave One Out (LOO) cross-validation
Setting K = n (the number of observations) yields n-fold and is called leave-one out cross-validation (LOO), a special case of the K-fold approach.
LOO CV is sometimes useful but typically doesn't shake up the data enough. The estimates from each fold are highly correlated and hence their average can have high variance. This is why the usual choice is K=5 or 10. It provides a good compromise for the bias-variance tradeoff.

QUESTION 26
You use the Azure Machine Learning service to create a tabular dataset named training_data. You plan to use this dataset in a training script.
You create a variable that references the dataset using the following code:
training_ds = workspace.datasets.get("training_data")
You define an estimator to run the script.
You need to set the correct property of the estimator to ensure that your script can access the training_data dataset.
Which property should you set?

A. environment_definition = {"training_data":training_ds}
B. inputs = [training_ds.as_named_input('training_ds')]
C. script_params = {"--training_ds":training_ds}
D. source_directory = training_ds

Correct Answer: B
Section:
Explanation:
Example:
Get the training dataset diabetes_ds = ws.datasets.get("Diabetes Dataset") # Create an estimator that uses the remote compute hyper_estimator = SKLearn(source_directory=experiment_folder, inputs=[diabetes_ds.as_named_input('diabetes')], # Pass the dataset as an input compute_target = cpu_cluster, conda_packages=['pandas','ipykernel','matplotlib'], pip_packages=['azureml-sdk','argparse','pyarrow'], entry_script='diabetes_training.py')
Reference: https://notebooks.azure.com/GraemeMalcolm/projects/azureml-primers/html/04%20-%20Optimizing%20Model%20Training.ipynb

QUESTION 27
You register a file dataset named csv_folder that references a folder. The folder includes multiple comma-separated values (CSV) files in an Azure storage blob container.
You plan to use the following code to run a script that loads data from the file dataset. You create and instantiate the following variables:

Variable	Description
remote_cluster	References the Azure Machine Learning compute cluster
ws	References the Azure Machine Learning workspace

You have the following code:

```
from azureml.train.estimator import Estimator
file_dataset = ws.datasets.get('csv_folder')
estimator = Estimator(source_directory=script_folder,

compute_target = remote_cluster,
entry_script ='script.py')
run = experiment.submit(config=estimator)
run.wait_for_completion(show_output=True)
```

You need to pass the dataset to ensure that the script can read the files it references.
Which code segment should you insert to replace the code comment?

A. inputs=[file_dataset.as_named_input('training_files')],
B. inputs=[file_dataset.as_named_input('training_files').as_mount()],
C. inputs=[file_dataset.as_named_input('training_files').to_pandas_dataframe()],
D. script_params={'--training_files': file_dataset},

Correct Answer: B
Section:
Explanation:
Example:
from azureml.train.estimator import Estimator
script_params = {
# to mount files referenced by mnist dataset
'--data-folder': mnist_file_dataset.as_named_input('mnist_opendataset').as_mount(),
'--regularization': 0.5
}
est = Estimator(source_directory=script_folder,
script_params=script_params,
compute_target=compute_target,
environment_definition=env,
entry_script='train.py')
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/tutorial-train-models-with-aml

QUESTION 28
You are creating a new Azure Machine Learning pipeline using the designer.
The pipeline must train a model using data in a comma-separated values (CSV) file that is published on a website. You have not created a dataset for this file.
You need to ingest the data from the CSV file into the designer pipeline using the minimal administrative effort.
Which module should you add to the pipeline in Designer?

A. Convert to CSV
B. Enter Data Manually

C. Import Data

D. Dataset

Correct Answer: D
Section:
Explanation:

QUESTION 29
You define a datastore named ml-data for an Azure Storage blob container. In the container, you have a folder named train that contains a file named data.csv. You plan to use the file to train a model by using the Azure Machine Learning
SDK.
You plan to train the model by using the Azure Machine Learning SDK to run an experiment on local compute.
You define a DataReference object by running the following code:

```
from azureml.core import Workspace, Datastore, Environment
from azureml.train.estimator import Estimator
ws = Workspace.from_config()
ml_data = = Datastore.get(ws, datastore_name='ml-data')
data_ref = ml_data.path('train').as_download(path_on_compute='train_data')
estimator = Estimator(source_directory='experiment_folder',
  script_params={'--data-folder': data_ref},
  compute_target = 'local',
  entry_script='training.py')
run = experiment.submit(config=estimator)
run.wait_for_completion(show_output=True)
```

You need to load the training data.
Which code segment should you use?

A.

```
import os
import argparse
import pandas as pd

parser = argparse.ArgumentParser()
parser.add_argument('--data-folder', type=str, dest='data_folder')
data_folder = args.data_folder
data = pd.read_csv(os.path.join(data_folder,'ml-data','train_data','data.csv'))
```

B.

```
import os
import argparse
import pandas as pd

parser = argparse.ArgumentParser()
parser.add_argument('--data-folder', type=str, dest='data_folder')
data_folder = args.data_folder
data = pd.read_csv(os.path.join(data_folder,'train','data.csv'))
```

C.

```
import pandas as pd

data = pd.read_csv('./data.csv')
```

D.

```
import os
import argparse
import pandas as pd

parser = argparse.ArgumentParser()
parser.add_argument('--data-folder', type=str, dest='data_folder')
data_folder = args.data_folder
data = pd.read_csv(os.path.join('ml_data', data_folder,'data.csv'))
```

E.

```
import os
import argparse
import pandas as pd

parser = argparse.ArgumentParser()
parser.add_argument('--data-folder', type=str, dest='data_folder')
data_folder = args.data_folder
data = pd.read_csv(os.path.join(data_folder,'data.csv'))
```

Correct Answer: E
Section:
Explanation:
Example:
data_folder = args.data_folder # Load Train and Test data train_data = pd.read_csv(os.path.join(data_folder, 'data.csv'))
Reference:
https://www.element61.be/en/resource/azure-machine-learning-services-complete-toolbox-ai

QUESTION 30
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create an Azure Machine Learning service datastore in a workspace. The datastore contains the following files:
/data/2018/Q1.csv
/data/2018/Q2.csv
/data/2018/Q3.csv
/data/2018/Q4.csv
/data/2019/Q1.csv
All files store data in the following format:
id,f1,f2,I
1,1,2,0
2,1,1,1
3,2,1,0

4,2,2,1
You run the following code:

```
data_store = Datastore.register_azure_blob_container(workspace=ws,
 datastore_name= 'data_store',
 container_name= 'quarterly_data',
 account_name='companydata',
 account_key='NRPxk8duxbM3…'
 create_if_not_exists=False)
```

You need to create a dataset named training_data and load the data from all files into a single data frame by using the following code:

```
data_frame = training_data.to_pandas_dataframe()
```

Solution: Run the following code:

```
from azureml.core import Dataset
paths = (data_store, 'data/*/*.csv')
training_data = Dataset.Tabular.from_delimited_files(paths)
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Define paths with two file paths instead.
Use Dataset.Tabular_from_delimeted as the data isn't cleansed.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-register-datasets

QUESTION 31
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create an Azure Machine Learning service datastore in a workspace. The datastore contains the following files:
/data/2018/Q1.csv
/data/2018/Q2.csv
/data/2018/Q3.csv
/data/2018/Q4.csv
/data/2019/Q1.csv
All files store data in the following format:
id,f1,f2,I
1,1,2,0
2,1,1,1
3,2,1,0
4,2,2,1
You run the following code:

```
data_store = Datastore.register_azure_blob_container(workspace=ws,
 datastore_name= 'data_store',
 container_name= 'quarterly_data',
 account_name='companydata',
 account_key='NRPxk8duxbM3…'
 create_if_not_exists=False)
```

You need to create a dataset named training_data and load the data from all files into a single data frame by using the following code:

```
data_frame = training_data.to_pandas_dataframe()
```

Solution: Run the following code:

```
from azureml.core import Dataset
paths = [(data_store, 'data/2018/*.csv'), (data_store, 'data/2019/*.csv')]
training_data = Dataset.File.from_files(paths)
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Use two file paths.
Use Dataset.Tabular_from_delimeted, instead of Dataset.File.from_files as the data isn't cleansed.
Note:
A FileDataset references single or multiple files in your datastores or public URLs. If your data is already cleansed, and ready to use in training experiments, you can download or mount the files to your compute as a FileDataset object.
A TabularDataset represents data in a tabular format by parsing the provided file or list of files. This provides you with the ability to materialize the data into a pandas or Spark DataFrame so you can work with familiar data preparation and training libraries without having to leave your notebook. You can create a TabularDataset object from .csv, .tsv, .parquet, .jsonl files, and from SQL query results.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-register-datasets

QUESTION 32
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create an Azure Machine Learning service datastore in a workspace. The datastore contains the following files:
/data/2018/Q1.csv
/data/2018/Q2.csv
/data/2018/Q3.csv
/data/2018/Q4.csv
/data/2019/Q1.csv
All files store data in the following format:
id,f1,f2,l
1,1,2,0
2,1,1,1
3,2,1,0
4,2,2,1
You run the following code:

```
data_store = Datastore.register_azure_blob_container(workspace=ws,
 datastore_name= 'data_store',
 container_name= 'quarterly_data',
 account_name='companydata',
 account_key='NRPxk8duxbM3…'
 create_if_not_exists=False)
```

You need to create a dataset named training_data and load the data from all files into a single data frame by using the following code:

```
data_frame = training_data.to_pandas_dataframe()
```

Solution: Run the following code:

```
from azureml.core import Dataset
paths = [(data_store, 'data/2018/*.csv'),(data_store, 'data/2019/*.csv')]
training_data = Dataset.Tabular.from_delimited_files(paths)
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
Use two file paths.
Use Dataset.Tabular_from_delimeted as the data isn't cleansed.
Note:
A TabularDataset represents data in a tabular format by parsing the provided file or list of files. This provides you with the ability to materialize the data into a pandas or Spark DataFrame so you can work with familiar data preparation and training libraries without having to leave your notebook. You can create a TabularDataset object from .csv, .tsv, .parquet, .jsonl files, and from SQL query results.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-register-datasets

QUESTION 33
You plan to use the Hyperdrive feature of Azure Machine Learning to determine the optimal hyperparameter values when training a model.
You must use Hyperdrive to try combinations of the following hyperparameter values:
learning_rate: any value between 0.001 and 0.1 batch_size: 16, 32, or 64
You need to configure the search space for the Hyperdrive experiment.
Which two parameter expressions should you use? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. a choice expression for learning_rate
B. a uniform expression for learning_rate
C. a normal expression for batch_size
D. a choice expression for batch_size
E. a uniform expression for batch_size

Correct Answer: B, D
Section:
Explanation:
B: Continuous hyperparameters are specified as a distribution over a continuous range of values. Supported distributions include: uniform(low, high) - Returns a value uniformly distributed between low and high
D: Discrete hyperparameters are specified as a choice among discrete values. choice can be:

one or more comma-separated values a range object any arbitrary list object
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-tune-hyperparameters

QUESTION 34
You run an automated machine learning experiment in an Azure Machine Learning workspace. Information about the run is listed in the table below:

Experiment	Run ID	Status	Created on	Duration
auto_ml_clasification	AutoML_1234567890-123	Completed	11/11/2019 11:00:00 AM	00:27:11

You need to write a script that uses the Azure Machine Learning SDK to retrieve the best iteration of the experiment run.
Which Python code segment should you use?

A.
```
from azureml.core import Workspace
from azureml.train.automl.run import AutoMLRun
ws = Workspace.from_config()
automl_ex = ws.experiments.get('auto_ml_classification')
best_iter = automl_ex.archived_time.find('11/11/2019 11:00:00 AM')
```

B.
```
from azureml.core import Workspace
from azureml.train.automl.run import AutoMLRun
automl_ex = ws.experiments.get('auto_ml_classification')
automl_run = AutoMLRun(automl_ex, 'AutoML_1234567890-123')
best_iter = automl_run.current_run
```

C.
```
from azureml.core import Workspace
from azureml.train.automl.run import AutoMLRun
ws = Workspace.from_config()
automl_ex = ws.experiments.get('auto_ml_classification')
best_iter = list(automl_ex.get_runs())[0]
```

D.
```
from azureml.core import Workspace
from azureml.train.automl.run import AutoMLRun
ws = Workspace.from_config()
automl_ex = ws.experiments.get('auto_ml_classification')
automl_run = AutoMLRun(automl_ex, 'AutoML_1234567890-123')
best_iter = automl_run.get_output()[0]
```

E.

```
from azureml.core import Workspace
from azureml.train.automl.run import AutoMLRun
ws = Workspace.from_config()
automl_ex = ws.experiments.get('auto_ml_classification')
best_iter = automl_ex.get_runs('AutoML_1234567890-123')
```

Correct Answer: D
Section:
Explanation:
The get_output method on automl_classifier returns the best run and the fitted model for the last invocation. Overloads on get_output allow you to retrieve the best run and fitted model for any logged metric or for a particular iteration.
In [ ]:
best_run, fitted_model = local_run.get_output()
Reference:
https://notebooks.azure.com/azureml/projects/azureml-getting-started/html/how-to-use-azureml/automated-machine-learning/classification-with-deployment/auto-ml-classification-with-deployment.ipynb

QUESTION 35
You have a comma-separated values (CSV) file containing data from which you want to train a classification model.
You are using the Automated Machine Learning interface in Azure Machine Learning studio to train the classification model. You set the task type to Classification.
You need to ensure that the Automated Machine Learning process evaluates only linear models.
What should you do?

A. Add all algorithms other than linear ones to the blocked algorithms list.
B. Set the Exit criterion option to a metric score threshold.
C. Clear the option to perform automatic featurization.
D. Clear the option to enable deep learning.
E. Set the task type to Regression.

Correct Answer: A
Section:
Explanation:
Automatic featurization can fit non-linear models.
Reference: https://econml.azurewebsites.net/spec/estimation/dml.html https://docs.microsoft.com/en-us/azure/machine-learning/how-to-use-automated-ml-for-ml-models

QUESTION 36
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You plan to use a Python script to run an Azure Machine Learning experiment. The script creates a reference to the experiment run context, loads data from a file, identifies the set of unique values for the label column, and completes the experiment run:
from azureml.core import Run
import pandas as pd
run = Run.get_context()
data = pd.read_csv('data.csv')
label_vals = data['label'].unique()
# Add code to record metrics here

run.complete()
The experiment must record the unique labels in the data as metrics for the run that can be reviewed later.
You must add code to the script to record the unique label values as run metrics at the point indicated by the comment.
Solution: Replace the comment with the following code:
run.upload_file('outputs/labels.csv', './data.csv')
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
label_vals has the unique labels (from the statement label_vals = data['label'].unique()), and it has to be logged.
Note:
Instead use the run_log function to log the contents in label_vals:
for label_val in label_vals: run.log('Label Values', label_val)
Reference:
https://www.element61.be/en/resource/azure-machine-learning-services-complete-toolbox-ai

QUESTION 37
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You plan to use a Python script to run an Azure Machine Learning experiment. The script creates a reference to the experiment run context, loads data from a file, identifies the set of unique values for the label column, and completes the experiment run:
from azureml.core import Run
import pandas as pd
run = Run.get_context()
data = pd.read_csv('data.csv')
label_vals = data['label'].unique()
# Add code to record metrics here
run.complete()
The experiment must record the unique labels in the data as metrics for the run that can be reviewed later.
You must add code to the script to record the unique label values as run metrics at the point indicated by the comment.
Solution: Replace the comment with the following code:
run.log_table('Label Values', label_vals)
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Instead use the run_log function to log the contents in label_vals:
for label_val in label_vals: run.log('Label Values', label_val)
Reference:

https://www.element61.be/en/resource/azure-machine-learning-services-complete-toolbox-ai

QUESTION 38
Note: This question-is part of a series of questions that present the same scenario. Each question-in the series contains a unique solution that might meet the stated goals. Some question-sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question-in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You plan to use a Python script to run an Azure Machine Learning experiment. The script creates a reference to the experiment run context, loads data from a file, identifies the set of unique values for the label column, and completes the experiment run:
from azureml.core import Run
import pandas as pd run = Run.get_context() data = pd.read_csv('data.csv') label_vals = data['label'].unique() # Add code to record metrics here run.complete()
The experiment must record the unique labels in the data as metrics for the run that can be reviewed later.
You must add code to the script to record the unique label values as run metrics at the point indicated by the comment.
Solution: Replace the comment with the following code:
for label_val in label_vals:
run.log('Label Values', label_val)
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
The run_log function is used to log the contents in label_vals:
for label_val in label_vals: run.log('Label Values', label_val)
Reference: https://www.element61.be/en/resource/azure-machine-learning-services-complete-toolbox-ai

QUESTION 39
You are solving a classification task.
You must evaluate your model on a limited data sample by using k-fold cross-validation. You start by configuring a k parameter as the number of splits.
You need to configure the k parameter for the cross-validation.
Which value should you use?

A. k=0.5
B. k=0.01
C. k=5
D. k=1

Correct Answer: C
Section:
Explanation:
Leave One Out (LOO) cross-validation
Setting K = n (the number of observations) yields n-fold and is called leave-one out cross-validation (LOO), a special case of the K-fold approach.
LOO CV is sometimes useful but typically doesn't shake up the data enough. The estimates from each fold are highly correlated and hence their average can have high variance. This is why the usual choice is K=5 or 10. It provides a good compromise for the bias-variance tradeoff.

QUESTION 40

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create a model to forecast weather conditions based on historical data.
You need to create a pipeline that runs a processing script to load data from a datastore and pass the processed data to a machine learning model training script.
Solution: Run the following code:

```
datastore = ws.get_default_datastore()
data_output = pd.read_csv("traindata.csv")
process_step = PythonScriptStep(script_name="process.py",
 arguments=["--data_for_train", data_output],
 outputs=[data_output],compute_target=aml_compute,
 source_directory=process_directory)
train_step = PythonScriptStep(script_name="train.py",
 arguments=["--data_for_train", data_output],
 inputs=[data_output],compute_target=aml_compute,
 source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step, train_step])
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
The two steps are present: process_step and train_step
The training data input is not setup correctly.
Note:
Data used in pipeline can be produced by one step and consumed in another step by providing a PipelineData object as an output of one step and an input of one or more subsequent steps.
PipelineData objects are also used when constructing Pipelines to describe step dependencies. To specify that a step requires the output of another step as input, use a PipelineData object in the constructor of both steps.
For example, the pipeline train step depends on the process_step_output output of the pipeline process step:

```
from azureml.pipeline.core import Pipeline, PipelineData
from azureml.pipeline.steps import PythonScriptStep
datastore = ws.get_default_datastore()
process_step_output = PipelineData("processed_data", datastore=datastore)
process_step = PythonScriptStep(script_name="process.py",
arguments=["--data_for_train", process_step_output],
outputs=[process_step_output],
compute_target=aml_compute,
source_directory=process_directory)
train_step = PythonScriptStep(script_name="train.py",
arguments=["--data_for_train", process_step_output],
inputs=[process_step_output],
compute_target=aml_compute,
```

source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step, train_step])
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-pipeline-core/azureml.pipeline.core.pipelinedata?view=azure-ml-py

QUESTION 41
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create a model to forecast weather conditions based on historical data.
You need to create a pipeline that runs a processing script to load data from a datastore and pass the processed data to a machine learning model training script.
Solution: Run the following code:

```
datastore = ws.get_default_datastore()
data_output = PipelineData("processed_data", datastore=datastore)
process_step = PythonScriptStep(script_name="process.py",
 arguments=["--data_for_train", data_output],
 outputs=[data_output], compute_target=aml_compute,
 source_directory=process_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step])
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
train_step is missing.
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-pipeline-core/azureml.pipeline.core.pipelinedata?view=azure-ml-py

QUESTION 42
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create a model to forecast weather conditions based on historical data.
You need to create a pipeline that runs a processing script to load data from a datastore and pass the processed data to a machine learning model training script.
Solution: Run the following code:

```
datastore = ws.get_default_datastore()
data_input = PipelineData("raw_data", datastore=rawdatastore)
data_output = PipelineData("processed_data", datastore=datastore)
process_step = PythonScriptStep(script_name="process.py",
 arguments=["--data_for_train", data_input],
 outputs=[data_output], compute_target=aml_compute,
 source_directory=process_directory)
train_step = PythonScriptStep(script_name="train.py",
 arguments=["--data_for_train", data_input], inputs=[data_output],
 compute_target=aml_compute, source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step, train_step])
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
Note: Data used in pipeline can be produced by one step and consumed in another step by providing a PipelineData object as an output of one step and an input of one or more subsequent steps.
Compare with this example, the pipeline train step depends on the process_step_output output of the pipeline process step:

```
from azureml.pipeline.core import Pipeline, PipelineData
from azureml.pipeline.steps import PythonScriptStep
datastore = ws.get_default_datastore()
process_step_output = PipelineData("processed_data", datastore=datastore)
process_step = PythonScriptStep(script_name="process.py",
arguments=["--data_for_train", process_step_output],
outputs=[process_step_output],
compute_target=aml_compute,
source_directory=process_directory)
train_step = PythonScriptStep(script_name="train.py",
arguments=["--data_for_train", process_step_output],
inputs=[process_step_output],
compute_target=aml_compute,
source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step, train_step])
```

Reference:
https://docs.microsoft.com/en-us/python/api/azureml-pipeline-core/azureml.pipeline.core.pipelinedata?view=azure-ml-py

QUESTION 43
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You have a Python script named train.py in a local folder named scripts. The script trains a regression model by using scikit-learn. The script includes code to load a training data file which is also located in the scripts folder.

You must run the script as an Azure ML experiment on a compute cluster named aml-compute.
You need to configure the run to ensure that the environment includes the required packages for model training. You have instantiated a variable named aml-compute that references the target compute cluster.
Solution: Run the following code:

```
from azureml.train.sklearn import SKLearn
sk_est = SKLearn(source_directory='./scripts',
 compute_target=aml-compute,
 entry_script='train.py')
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
The scikit-learn estimator provides a simple way of launching a scikit-learn training job on a compute target. It is implemented through the SKLearn class, which can be used to support single-node CPU training.
Example:
from azureml.train.sklearn import SKLearn
}
estimator = SKLearn(source_directory=project_folder,
compute_target=compute_target,
entry_script='train_iris.py'
)
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-train-scikit-learn

QUESTION 44
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You have a Python script named train.py in a local folder named scripts. The script trains a regression model by using scikit-learn. The script includes code to load a training data file which is also located in the scripts folder.
You must run the script as an Azure ML experiment on a compute cluster named aml-compute.
You need to configure the run to ensure that the environment includes the required packages for model training. You have instantiated a variable named aml-compute that references the target compute cluster.
Solution: Run the following code:

```
from azureml.train.dnn import TensorFlow
sk_est = TensorFlow(source_directory='./scripts',
 compute_target=aml-compute,
 entry_script='train.py')
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B

Section:
Explanation:
The scikit-learn estimator provides a simple way of launching a scikit-learn training job on a compute target. It is implemented through the SKLearn class, which can be used to support single-node CPU training.
Example:
from azureml.train.sklearn import SKLearn
}
estimator = SKLearn(source_directory=project_folder, compute_target=compute_target,
entry_script='train_iris.py')
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-train-scikit-learn

QUESTION 45
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You have a Python script named train.py in a local folder named scripts. The script trains a regression model by using scikit-learn. The script includes code to load a training data file which is also located in the scripts folder.
You must run the script as an Azure ML experiment on a compute cluster named aml-compute.
You need to configure the run to ensure that the environment includes the required packages for model training. You have instantiated a variable named aml-compute that references the target compute cluster.
Solution: Run the following code:

```
from azureml.train.estimator import Estimator
sk_est = Estimator(source_directory='./scripts',
 compute_target=aml-compute,
 entry_script='train.py',
 conda_packages=['scikit-learn'])
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:
The scikit-learn estimator provides a simple way of launching a scikit-learn training job on a compute target. It is implemented through the SKLearn class, which can be used to support single-node CPU training.
Example:
from azureml.train.sklearn import SKLearn
}
estimator = SKLearn(source_directory=project_folder, compute_target=compute_target,
entry_script='train_iris.py')
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-train-scikit-learn

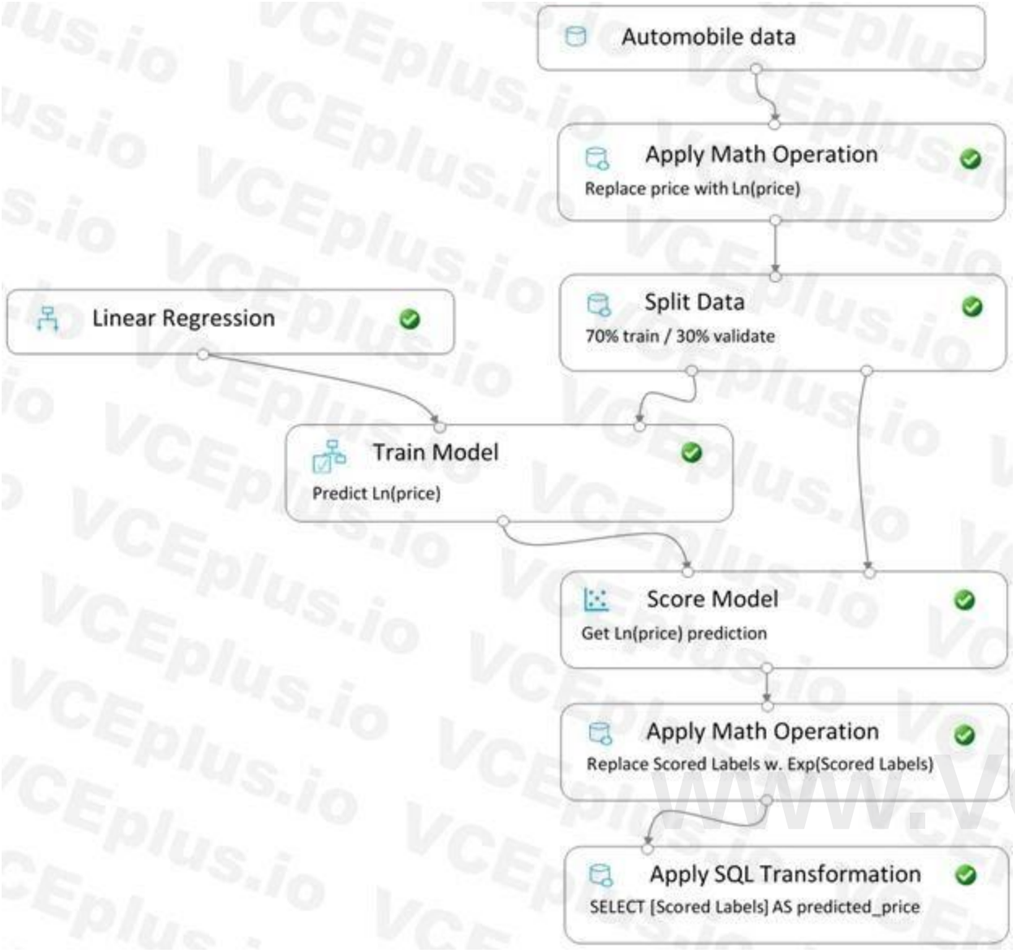
QUESTION 46
You create a multi-class image classification deep learning model that uses a set of labeled images. You create a script file named train.py that uses the PyTorch 1.3 framework to train the model.
You must run the script by using an estimator. The code must not require any additional Python libraries to be installed in the environment for the estimator. The time required for model training must be minimized.

You need to define the estimator that will be used to run the script.
Which estimator type should you use?

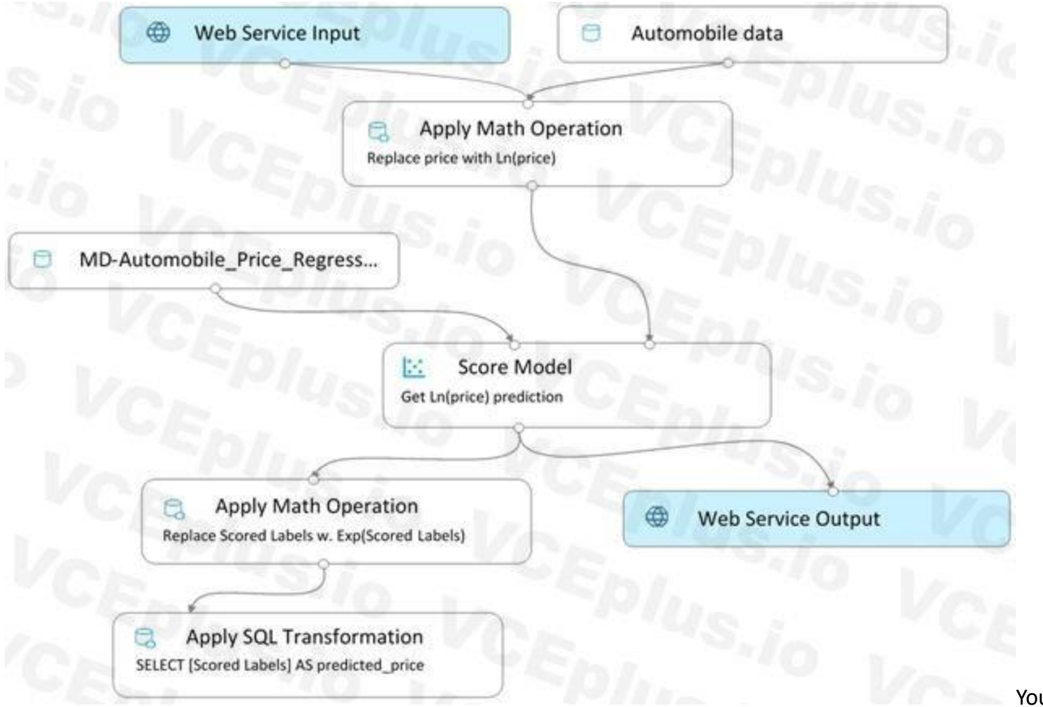
A. TensorFlow
B. PyTorch
C. SKLearn
D. Estimator

Correct Answer: B
Section:
Explanation:
For PyTorch, TensorFlow and Chainer tasks, Azure Machine Learning provides respective PyTorch, TensorFlow, and Chainer estimators to simplify using these frameworks.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-train-ml-models

QUESTION 47
You create a pipeline in designer to train a model that predicts automobile prices.
Because of non-linear relationships in the data, the pipeline calculates the natural log (Ln) of the prices in the training data, trains a model to predict this natural log of price value, and then calculates the exponential of the scored label to get the predicted price.
The training pipeline is shown in the exhibit. (Click the Training pipeline tab.)
Training pipeline



You create a real-time inference pipeline from the training pipeline, as shown in the exhibit. (Click the Real-time pipeline tab.)
Real-time pipeline



You need to modify the inference pipeline to ensure that the web service returns the exponential of the scored label as the predicted automobile price and that client applications are not required to include a price value in the input values.
Which three modifications must you make to the inference pipeline? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Connect the output of the Apply SQL Transformation to the Web Service Output module.
B. Replace the Web Service Input module with a data input that does not include the price column.
C. Add a Select Columns module before the Score Model module to select all columns other than price.
D. Replace the training dataset module with a data input that does not include the price column.
E. Remove the Apply Math Operation module that replaces price with its natural log from the data flow.
F. Remove the Apply SQL Transformation module from the data flow.

Correct Answer: A, C, E
Section:

QUESTION 48
You are creating a classification model for a banking company to identify possible instances of credit card fraud. You plan to create the model in Azure Machine Learning by using automated machine learning.
The training dataset that you are using is highly unbalanced.
You need to evaluate the classification model.
Which primary metric should you use?

A. normalized_mean_absolute_error
B. AUC_weighted
C. accuracy
D. normalized_root_mean_squared_error

E. spearman_correlation

Correct Answer: B
Section:
Explanation:
AUC_weighted is a Classification metric.
Note: AUC is the Area under the Receiver Operating Characteristic Curve. Weighted is the arithmetic mean of the score for each class, weighted by the number of true instances in each class.
Incorrect Answers:
A: normalized_mean_absolute_error is a regression metric, not a classification metric.
C: When comparing approaches to imbalanced classification problems, consider using metrics beyond accuracy such as recall, precision, and AUROC. It may be that switching the metric you optimize for during parameter selection or model selection is enough to provide desirable performance detecting the minority class.
D: normalized_root_mean_squared_error is a regression metric, not a classification metric.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-understand-automated-ml

QUESTION 49
You create a machine learning model by using the Azure Machine Learning designer. You publish the model as a real-time service on an Azure Kubernetes Service (AKS) inference compute cluster. You make no change to the deployed endpoint configuration.
You need to provide application developers with the information they need to consume the endpoint.
Which two values should you provide to application developers? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. The name of the AKS cluster where the endpoint is hosted.
B. The name of the inference pipeline for the endpoint.
C. The URL of the endpoint.
D. The run ID of the inference pipeline experiment for the endpoint.
E. The key for the endpoint.

Correct Answer: C, E
Section:
Explanation:
Deploying an Azure Machine Learning model as a web service creates a REST API endpoint. You can send data to this endpoint and receive the prediction returned by the model.
You create a web service when you deploy a model to your local environment, Azure Container Instances, Azure Kubernetes Service, or field-programmable gate arrays (FPGA). You retrieve the URI used to access the web service by using the Azure Machine Learning SDK. If authentication is enabled, you can also use the SDK to get the authentication keys or tokens.
Example:
# URL for the web service
scoring_uri = '<your web service URI>'
# If the service is authenticated, set the key or token key = '<your key or token>'
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-consume-web-service

QUESTION 50
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You create a model to forecast weather conditions based on historical data.
You need to create a pipeline that runs a processing script to load data from a datastore and pass the processed data to a machine learning model training script.
Solution: Run the following code:

```
data_store = Datastore.get(ws, "ml-data")
data_input = DataReference(
    datastore = data_store,
    data_reference_name = "training_data",
    path_on_datastore = "train/data.txt")
data_output = PipelineData("processed_data", datastore=datastore)
process_step = PythonScriptStep(script_name= "process.py",
    arguments=[ "- -data", data_input], outputs=[data_output],
    compute_target=aml_compute, source_directory=process_directory)
train_step = PythonScriptStep(script_name= "train.py",
     arguments=["- -data", data_output], inputs=[data_output],
     compute_target=aml_compute, source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps = [process_step, train_step])
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: A
Section:
Explanation:
The two steps are present: process_step and train_step Data_input correctly references the data in the data store.
Note:
Data used in pipeline can be produced by one step and consumed in another step by providing a PipelineData object as an output of one step and an input of one or more subsequent steps.
PipelineData objects are also used when constructing Pipelines to describe step dependencies. To specify that a step requires the output of another step as input, use a PipelineData object in the constructor of both steps.
For example, the pipeline train step depends on the process_step_output output of the pipeline process step:
from azureml.pipeline.core import Pipeline, PipelineData from azureml.pipeline.steps import PythonScriptStep
datastore = ws.get_default_datastore()
process_step_output = PipelineData("processed_data", datastore=datastore) process_step = PythonScriptStep(script_name="process.py", arguments=["--data_for_train", process_step_output], outputs=[process_step_output], compute_target=aml_compute, source_directory=process_directory)
train_step = PythonScriptStep(script_name="train.py", arguments=["--data_for_train", process_step_output], inputs=[process_step_output], compute_target=aml_compute, source_directory=train_directory)
pipeline = Pipeline(workspace=ws, steps=[process_step, train_step])
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-pipeline-core/azureml.pipeline.core.pipelinedata?view=azure-ml-py

QUESTION 51
You run an experiment that uses an AutoMLConfig class to define an automated machine learning task with a maximum of ten model training iterations. The task will attempt to find the best performing model based on a metric named accuracy.
You submit the experiment with the following code:

```
from azureml.core.experiment import Experiment
automl_experiment = Experiment(ws, 'automl_experiment')
automl_run = automl_experiment.submit(automl_config, show_output=True)
```

You need to create Python code that returns the best model that is generated by the automated machine learning task.
Which code segment should you use?

A. best_model = automl_run.get_details()
B. best_model = automl_run.get_metrics()
C. best_model = automl_run.get_file_names()[1]
D. best_model = automl_run.get_output()[1]

Correct Answer: D
Section:
Explanation:
The get_output method returns the best run and the fitted model.
Reference:
https://notebooks.azure.com/azureml/projects/azureml-getting-started/html/how-to-use-azureml/automated-machine-learning/classification/auto-ml-classification.ipynb

QUESTION 52
You plan to use the Hyperdrive feature of Azure Machine Learning to determine the optimal hyperparameter values when training a model.
You must use Hyperdrive to try combinations of the following hyperparameter values. You must not apply an early termination policy.
learning_rate: any value between 0.001 and 0.1
batch_size: 16, 32, or 64
You need to configure the sampling method for the Hyperdrive experiment.
Which two sampling methods can you use? Each correct answer is a complete solution.
NOTE: Each correct selection is worth one point.

A. No sampling
B. Grid sampling
C. Bayesian sampling
D. Random sampling

Correct Answer: C, D
Section:
Explanation:
C: Bayesian sampling is based on the Bayesian optimization algorithm and makes intelligent choices on the hyperparameter values to sample next. It picks the sample based on how the previous samples performed, such that the new sample improves the reported primary metric.
Bayesian sampling does not support any early termination policy
Example:
from azureml.train.hyperdrive import BayesianParameterSampling
from azureml.train.hyperdrive import uniform, choice
param_sampling = BayesianParameterSampling({
"learning_rate": uniform(0.05, 0.1),
"batch_size": choice(16, 32, 64, 128)
}
)
D: In random sampling, hyperparameter values are randomly selected from the defined search space. Random sampling allows the search space to include both discrete and continuous hyperparameters.
Incorrect Answers:
B: Grid sampling can be used if your hyperparameter space can be defined as a choice among discrete values and if you have sufficient budget to exhaustively search over all values in the defined search space. Additionally, one can use automated early termination of poorly performing runs, which reduces wastage of resources.
Example, the following space has a total of six samples:
from azureml.train.hyperdrive import GridParameterSampling
from azureml.train.hyperdrive import choice

```
param_sampling = GridParameterSampling( {
"num_hidden_layers": choice(1, 2, 3),
"batch_size": choice(16, 32)
}
)
```

Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-tune-hyperparameters

QUESTION 53
You are training machine learning models in Azure Machine Learning. You use Hyperdrive to tune the hyperparameter.
In previous model training and tuning runs, many models showed similar performance.
You need to select an early termination policy that meets the following requirements:
accounts for the performance of all previous runs when evaluating the current run
avoids comparing the current run with only the best performing run to date
Which two early termination policies should you use? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Median stopping
B. Bandit
C. Default
D. Truncation selection

Correct Answer: A, D
Section:
Explanation:
The Median Stopping policy computes running averages across all runs and cancels runs whose best performance is worse than the median of the running averages.If no policy is specified, the hyperparameter tuning service will let all training runs execute to completion.
Reference:https://docs.microsoft.com/en-us/python/api/azureml-train- core/azureml.train.hyperdrive.medianstoppingpolicy
https://docs.microsoft.com/en-us/python/api/azureml-train- core/azureml.train.hyperdrive.truncationselectionpolicy
https://docs.microsoft.com/en-us/python/api/azureml-train- core/azureml.train.hyperdrive.banditpolicy

QUESTION 54
You use the Azure Machine Learning SDK in a notebook to run an experiment using a script file in an experiment folder.
The experiment fails.
You need to troubleshoot the failed experiment.
What are two possible ways to achieve this goal? Each correct answer presents a complete solution.

A. Use the get_metrics() method of the run object to retrieve the experiment run logs.
B. Use the get_details_with_logs() method of the run object to display the experiment run logs.
C. View the log files for the experiment run in the experiment folder.
D. View the logs for the experiment run in Azure Machine Learning studio.
E. Use the get_output() method of the run object to retrieve the experiment run logs.

Correct Answer: B, D
Section:
Explanation:
Use get_details_with_logs() to fetch the run details and logs created by the run.

You can monitor Azure Machine Learning runs and view their logs with the Azure Machine Learning studio.
Incorrect Answers:
A: You can view the metrics of a trained model using run.get_metrics(). E: get_output() gets the output of the step as PipelineData.
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-pipeline-core/azureml.pipeline.core.steprun https://docs.microsoft.com/en-us/azure/machine-learning/how-to-monitor-view-training-logs

QUESTION 55
You use the Two-Class Neural Network module in Azure Machine Learning Studio to build a binary classification model. You use the Tune Model Hyperparameters module to tune accuracy for the model.
You need to configure the Tune Model Hyperparameters module.
Which two values should you use? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Number of hidden nodes
B. Learning Rate
C. The type of the normalizer
D. Number of learning iterations
E. Hidden layer specification

Correct Answer: D, E
Section:
Explanation:
D: For Number of learning iterations, specify the maximum number of times the algorithm should process the training cases.
E: For Hidden layer specification, select the type of network architecture to create.
Between the input and output layers you can insert multiple hidden layers. Most predictive tasks can be accomplished easily with only one or a few hidden layers.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/two-class-neural-network

QUESTION 56
You create a binary classification model by using Azure Machine Learning Studio.
You must tune hyperparameters by performing a parameter sweep of the model. The parameter sweep must meet the following requirements:
iterate all possible combinations of hyperparameters
minimize computing resources required to perform the sweep
You need to perform a parameter sweep of the model.
Which parameter sweep mode should you use?

A. Random sweep
B. Sweep clustering
C. Entire grid
D. Random grid

Correct Answer: D
Section:
Explanation:
Maximum number of runs on random grid: This option also controls the number of iterations over a random sampling of parameter values, but the values are not generated randomly from the specified range; instead, a matrix is created of all possible combinations of parameter values and a random sampling is taken over the matrix. This method is more efficient and less prone to regional oversampling or undersampling.
If you are training a model that supports an integrated parameter sweep, you can also set a range of seed values to use and iterate over the random seeds as well. This is optional, but can be useful for avoiding bias introduced by seed selection.

Incorrect Answers:
B: If you are building a clustering model, use Sweep Clustering to automatically determine the optimum number of clusters and other parameters.
C: Entire grid: When you select this option, the module loops over a grid predefined by the system, to try different combinations and identify the best learner. This option is useful for cases where you don't know what the best parameter settings might be and want to try all possible combination of values.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/tune-model-hyperparameters

QUESTION 57
You are building a recurrent neural network to perform a binary classification.
You review the training loss, validation loss, training accuracy, and validation accuracy for each training epoch.
You need to analyze model performance.
You need to identify whether the classification model is overfitted.
Which of the following is correct?

A. The training loss stays constant and the validation loss stays on a constant value and close to the training loss value when training the model.
B. The training loss decreases while the validation loss increases when training the model.
C. The training loss stays constant and the validation loss decreases when training the model.
D. The training loss increases while the validation loss decreases when training the model.

Correct Answer: B
Section:
Explanation:
An overfit model is one where performance on the train set is good and continues to improve, whereas performance on the validation set improves to a point and then begins to degrade.
Reference:
https://machinelearningmastery.com/diagnose-overfitting-underfitting-lstm-models/

QUESTION 58
Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You have a Python script named train.py in a local folder named scripts. The script trains a regression model by using scikit-learn. The script includes code to load a training data file which is also located in the scripts folder.
You must run the script as an Azure ML experiment on a compute cluster named aml-compute.
You need to configure the run to ensure that the environment includes the required packages for model training. You have instantiated a variable named aml-compute that references the target compute cluster.
Solution: Run the following code:

```
from azureml.train.estimator import Estimator
sk_est = Estimator(source_directory='./scripts',
 compute_target=aml-compute,
 entry_script='train.py')
```

Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:

Explanation:
There is a missing line: conda_packages=['scikit-learn'], which is needed.
Correct example:
sk_est = Estimator(source_directory='./my-sklearn-proj',
script_params=script_params,
compute_target=compute_target,
entry_script='train.py',
conda_packages=['scikit-learn'])
Note:
The Estimator class represents a generic estimator to train data using any supplied framework.
This class is designed for use with machine learning frameworks that do not already have an Azure Machine Learning pre-configured estimator. Pre-configured estimators exist for Chainer, PyTorch, TensorFlow, and SKLearn.
Example:
from azureml.train.estimator import Estimator
script_params = {
# to mount files referenced by mnist dataset
'--data-folder': ds.as_named_input('mnist').as_mount(),
'--regularization': 0.8
}
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-train-core/azureml.train.estimator.estimator

QUESTION 59
You are performing clustering by using the K-means algorithm.
You need to define the possible termination conditions.
Which three conditions can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Centroids do not change between iterations.
B. The residual sum of squares (RSS) rises above a threshold.
C. The residual sum of squares (RSS) falls below a threshold.
D. A fixed number of iterations is executed.
E. The sum of distances between centroids reaches a maximum.

Correct Answer: A, C, D
Section:
Explanation:
AD: The algorithm terminates when the centroids stabilize or when a specified number of iterations are completed.
C: A measure of how well the centroids represent the members of their clusters is the residual sum of squares or RSS, the squared distance of each vector from its centroid summed over all vectors. RSS is the objective function and our goal is to minimize it.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/k-means-clustering https://nlp.stanford.edu/IR-book/html/htmledition/k-means-1.html

QUESTION 60
You are building a machine learning model for translating English language textual content into French language textual content.
You need to build and train the machine learning model to learn the sequence of the textual content.
Which type of neural network should you use?

A. Multilayer Perceptions (MLPs)
B. Convolutional Neural Networks (CNNs)
C. Recurrent Neural Networks (RNNs)
D. Generative Adversarial Networks (GANs)

Correct Answer: C
Section:
Explanation:
To translate a corpus of English text to French, we need to build a recurrent neural network (RNN).
Note: RNNs are designed to take sequences of text as inputs or return sequences of text as outputs, or both. They're called recurrent because the network's hidden layers have a loop in which the output and cell state from each time step become inputs at the next time step. This recurrence serves as a form of memory. It allows contextual information to flow through the network so that relevant outputs from previous time steps can be applied to network operations at the current time step.
Reference: https://towardsdatascience.com/language-translation-with-rnns-d84d43b40571

QUESTION 61
You create a binary classification model.
You need to evaluate the model performance.
Which two metrics can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. relative absolute error
B. precision
C. accuracy
D. mean absolute error
E. coefficient of determination

Correct Answer: B, C
Section:
Explanation:
The evaluation metrics available for binary classification models are: Accuracy, Precision, Recall, F1 Score, and AUC.
Note: A very natural question-is: 'Out of the individuals whom the model, how many were classified correctly (TP)?'
This question-can be answered by looking at the Precision of the model, which is the proportion of positives that are classified correctly.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio/evaluate-model-performance

QUESTION 62
You create a script that trains a convolutional neural network model over multiple epochs and logs the validation loss after each epoch. The script includes arguments for batch size and learning rate.
You identify a set of batch size and learning rate values that you want to try.
You need to use Azure Machine Learning to find the combination of batch size and learning rate that results in the model with the lowest validation loss.
What should you do?

A. Run the script in an experiment based on an AutoMLConfig object
B. Create a PythonScriptStep object for the script and run it in a pipeline
C. Use the Automated Machine Learning interface in Azure Machine Learning studio
D. Run the script in an experiment based on a ScriptRunConfig object

E. Run the script in an experiment based on a HyperDriveConfig object

Correct Answer: E
Section:
Explanation:
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-tune-hyperparameters

QUESTION 63
You use the Azure Machine Learning Python SDK to define a pipeline to train a model.
The data used to train the model is read from a folder in a datastore.
You need to ensure the pipeline runs automatically whenever the data in the folder changes.
What should you do?

A. Set the regenerate_outputs property of the pipeline to True
B. Create a ScheduleRecurrance object with a Frequency of auto. Use the object to create a Schedule for the pipeline
C. Create a PipelineParameter with a default value that references the location where the training data is stored
D. Create a Schedule for the pipeline. Specify the datastore in the datastore property, and the folder containing the training data in the path_on_datastore property

Correct Answer: D
Section:
Explanation:
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/how-to-trigger-published-pipeline

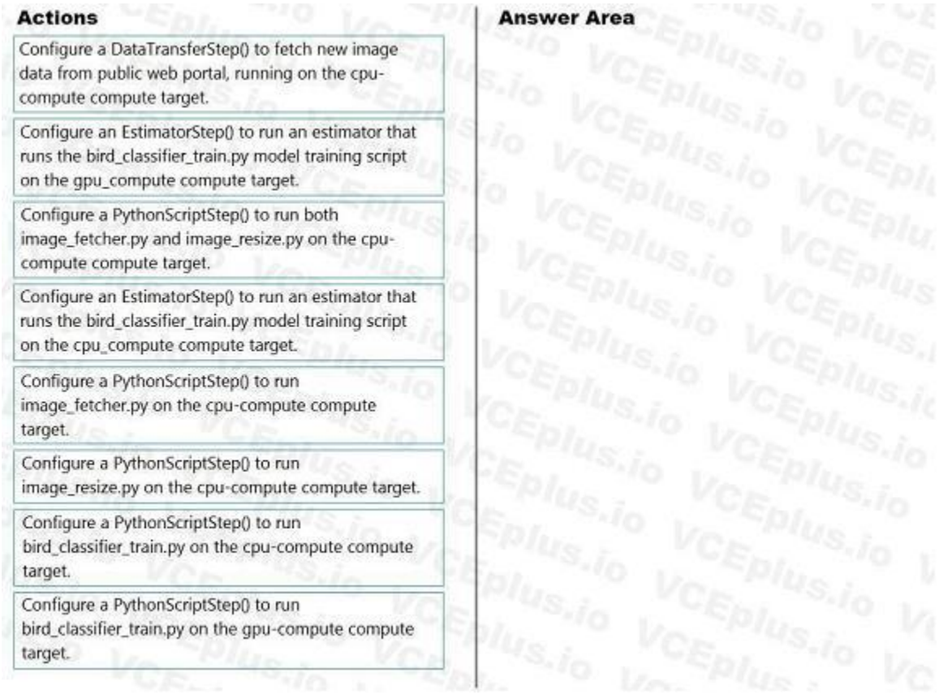
QUESTION 64
You plan to run a Python script as an Azure Machine Learning experiment.
The script must read files from a hierarchy of folders. The files will be passed to the script as a dataset argument.
You must specify an appropriate mode for the dataset argument.
Which two modes can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. to_pandas_dataframe()
B. as_download()
C. as_upload()
D. as_mount()

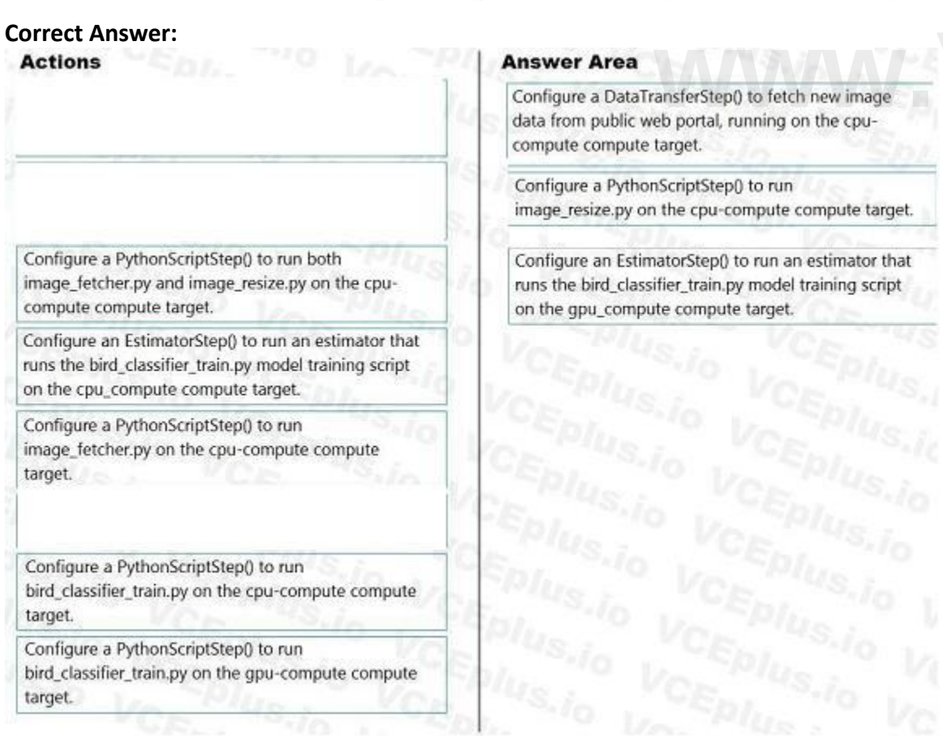
Correct Answer: B
Section:
Explanation:
Reference: https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.data.filedataset?view=azure-ml-py

QUESTION 65
DRAG DROP
You create a multi-class image classification deep learning experiment by using the PyTorch framework. You plan to run the experiment on an Azure Compute cluster that has nodes with GPU's.
You need to define an Azure Machine Learning service pipeline to perform the monthly retraining of the image classification model. The pipeline must run with minimal cost and minimize the time required to train the model.
Which three pipeline steps should you run in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:
Explanation:

Step 1: Configure a DataTransferStep() to fetch new image data…
Step 2: Configure a PythonScriptStep() to run image_resize.y on the cpu-compute compute target.
Step 3: Configure the EstimatorStep() to run training script on the gpu_compute computer target.
The PyTorch estimator provides a simple way of launching a PyTorch training job on a compute target.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-train-pytorch

QUESTION 66
HOTSPOT
You plan to use Hyperdrive to optimize the hyperparameters selected when training a model. You create the following code to define options for the hyperparameter experiment:

```
import azureml.train.hyperdrive.parameter_expressions as pe
from azureml.train.hyperdrive import GridParameterSampling, HyperDriveConfig

param_sampling = GridParameterSampling({
  "max_depth" : pe.choice(6, 7, 8, 9),
  "learning_rate" : pe.choice(0.05, 0.1, 0.15)
  })
hyperdrive_run_config = HyperDriveConfig(
  estimator = estimator,
  hyperparameter_sampling = param_sampling,
  policy = None,
  primary_metric_name = "auc",
  primary_metruc_goal = PrimaryMetricGoal.MAXIMIZE,
  max_total_runs = 50,
  max_concurrent_runs = 4)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

	Yes	No
There will be 50 runs for this hyperparameter tuning experiment.	○	○
You can use the policy parameter in the HyperDriveConfig class to specify a security policy.	○	○
The experiment will create a run for every possible value for the learning rate parameter between 0.05 and 0.15.	○	○

Answer Area:

Answer Area

	Yes	No
There will be 50 runs for this hyperparameter tuning experiment.	○	○
You can use the policy parameter in the HyperDriveConfig class to specify a security policy.	○	○
The experiment will create a run for every possible value for the learning rate parameter between 0.05 and 0.15.	○	○

Section:
Explanation:
Box 1: No max_total_runs (50 here)
The maximum total number of runs to create. This is the upper bound; there may be fewer runs when the sample space is smaller than this value.
Box 2: Yes
Policy EarlyTerminationPolicy
The early termination policy to use. If None - the default, no early termination policy will be used.
Box 3: No
Discrete hyperparameters are specified as a choice among discrete values. choice can be:
one or more comma-separated values
a range object
any arbitrary list object
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-train-core/azureml.train.hyperdrive.hyperdriveconfig
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-tune-hyperparameters

QUESTION 67
HOTSPOT
You are using Azure Machine Learning to train machine learning models. You need to compute target on which to remotely run the training script.
You run the following Python code:

```
from azureml.core.compute import ComputeTarget, AmlCompute
from azureml.core.compute_target import ComputeTargetException
the_cluster_name = "NewCompute"
config = AmlCompute.provisioning_configuration(vm_size= 'STANDARD_D2', max_nodes=3)
the_cluster = ComputeTarget.create(ws, the_cluster_name, config)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

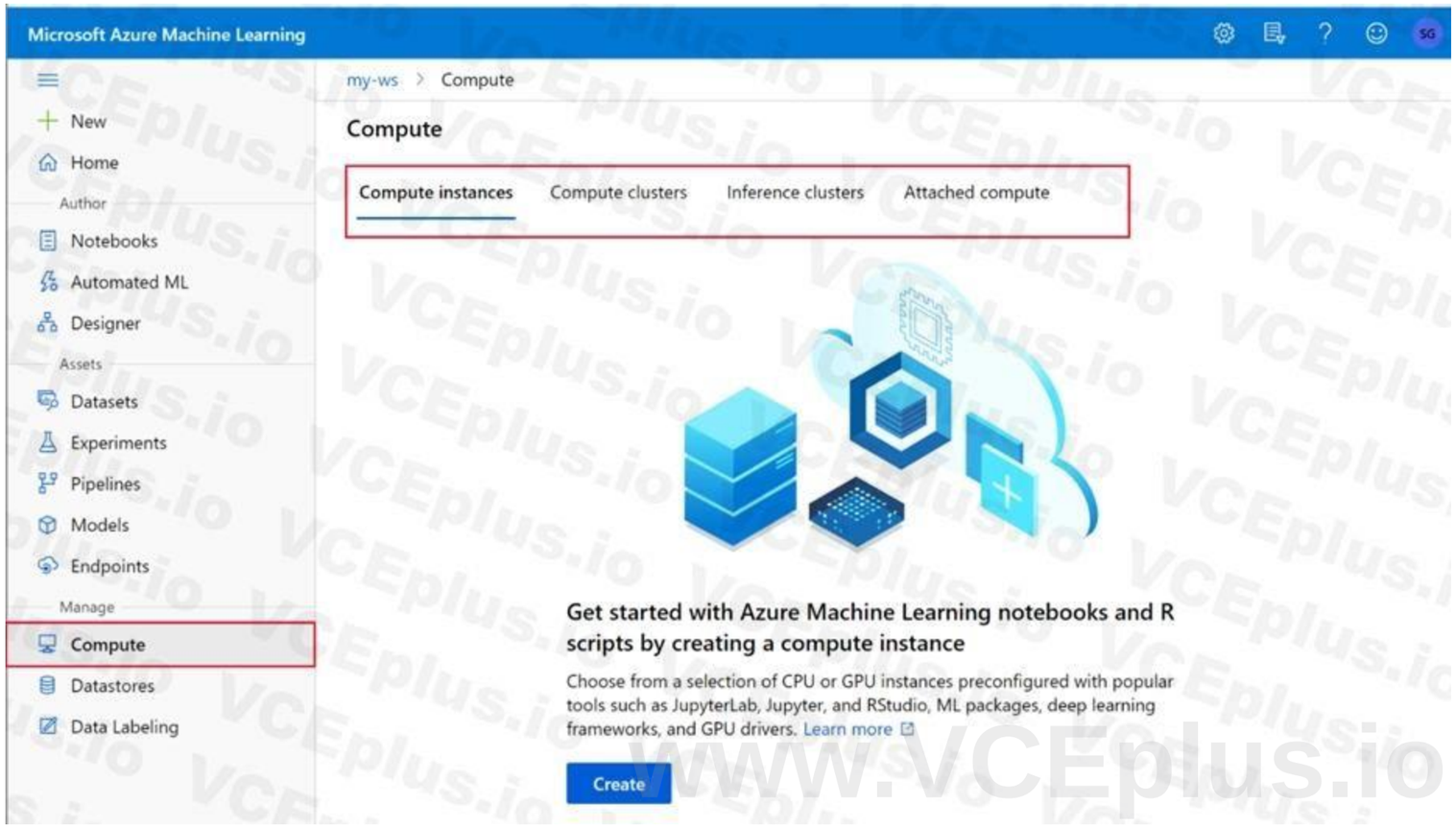
	Yes	No
The compute is created in the same region as the Machine Learning service workspace.	○	○
The compute resource created by the code is displayed as a compute cluster in Azure Machine Learning studio.	○	○
The minimum number of nodes will be zero.	○	○

Answer Area:

Answer Area

	Yes	No
The compute is created in the same region as the Machine Learning service workspace.	○	○
The compute resource created by the code is displayed as a compute cluster in Azure Machine Learning studio.	○	○
The minimum number of nodes will be zero.	○	○

Section:
Explanation:
Box 1: Yes
The compute is created within your workspace region as a resource that can be shared with other users.
Box 2: Yes
It is displayed as a compute cluster.
View compute targets
1. To see all compute targets for your workspace, use the following steps:
2. Navigate to Azure Machine Learning studio.
3. Under Manage, select Compute.
4. Select tabs at the top to show each type of compute target.



Box 3: Yes
min_nodes is not specified, so it defaults to 0.
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.compute.amlcompute.amlcomputeprovisioningconfiguration
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-attach-compute-studio

QUESTION 68
HOTSPOT
You have an Azure blob container that contains a set of TSV files. The Azure blob container is registered as a datastore for an Azure Machine Learning service workspace. Each TSV file uses the same data schema.
You plan to aggregate data for all of the TSV files together and then register the aggregated data as a dataset in an Azure Machine Learning workspace by using the Azure Machine Learning SDK for Python.
You run the following code.

```
from azureml.core.workspace import Workspace
from azureml.core.datastore import Datastore
from azureml.core.dataset import Dataset
import pandas as pd
datastore_paths = (datastore, './data/*.tsv')
myDataset_1 = Dataset.File.from_files(path=datastore_paths)
myDataset_2 = Dataset.Tabular.from_delimited_files(path=datastore_paths, separator='\t')
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

	Yes	No
The myDataset_1 dataset can be converted into a pandas dataframe by using the following method: `using myDataset_1.to_pandas_dataframe()`	○	○
The myDataset_1.to_path() method returns an array of file paths for all of the TSV files in the dataset.	○	○
The myDataset_2 dataset can be converted into a pandas dataframe by using the following method: `myDataset_2.to_pandas_dataframe()`	○	○

Answer Area:

Answer Area

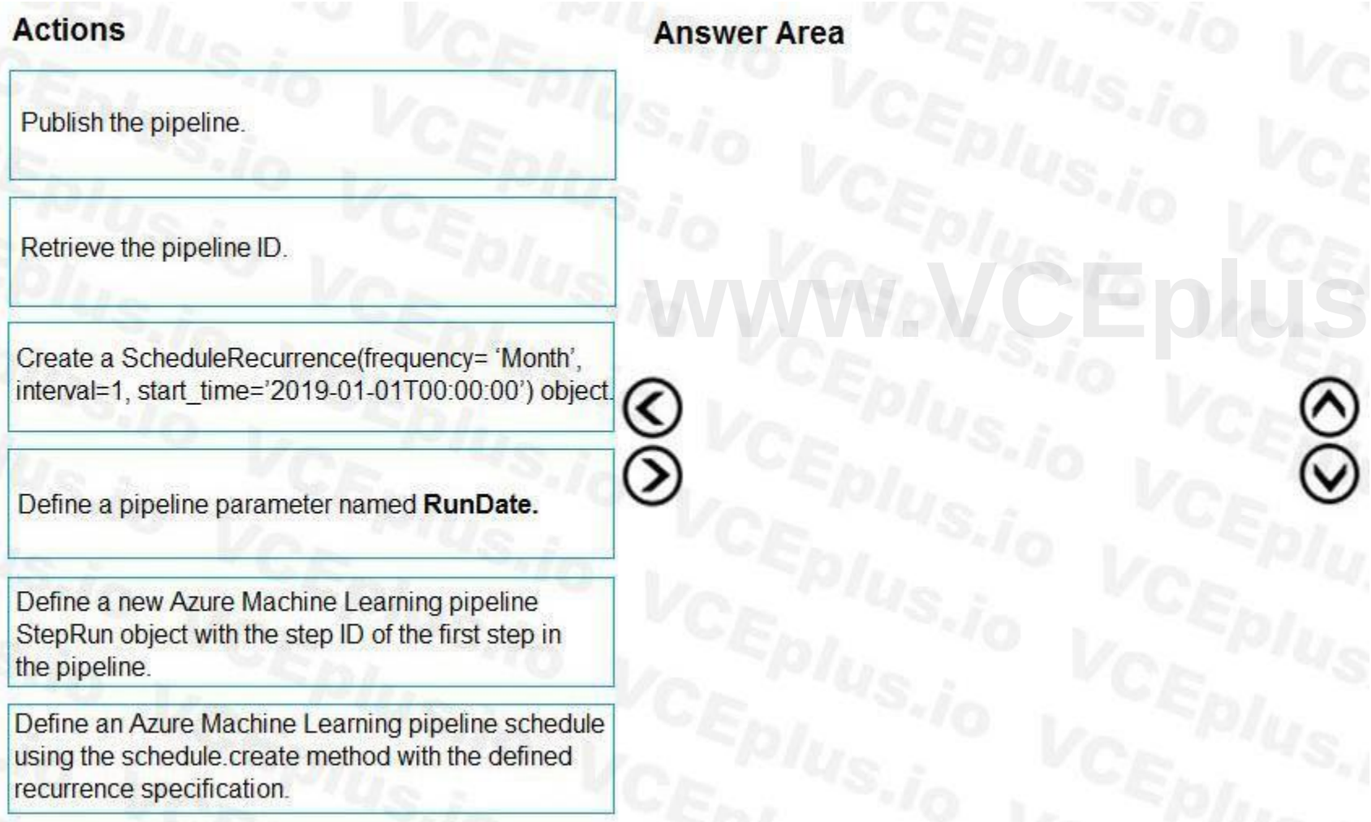
	Yes	No
The myDataset_1 dataset can be converted into a pandas dataframe by using the following method: `using myDataset_1.to_pandas_dataframe()`	○	○
The myDataset_1.to_path() method returns an array of file paths for all of the TSV files in the dataset.	○	○
The myDataset_2 dataset can be converted into a pandas dataframe by using the following method: `myDataset_2.to_pandas_dataframe()`	○	○

Section:
Explanation:
Box 1: No
FileDataset references single or multiple files in datastores or from public URLs. The TSV files need to be parsed.
Box 2: Yes
to_path() gets a list of file paths for each file stream defined by the dataset.
Box 3: Yes
TabularDataset.to_pandas_dataframe loads all records from the dataset into a pandas DataFrame.

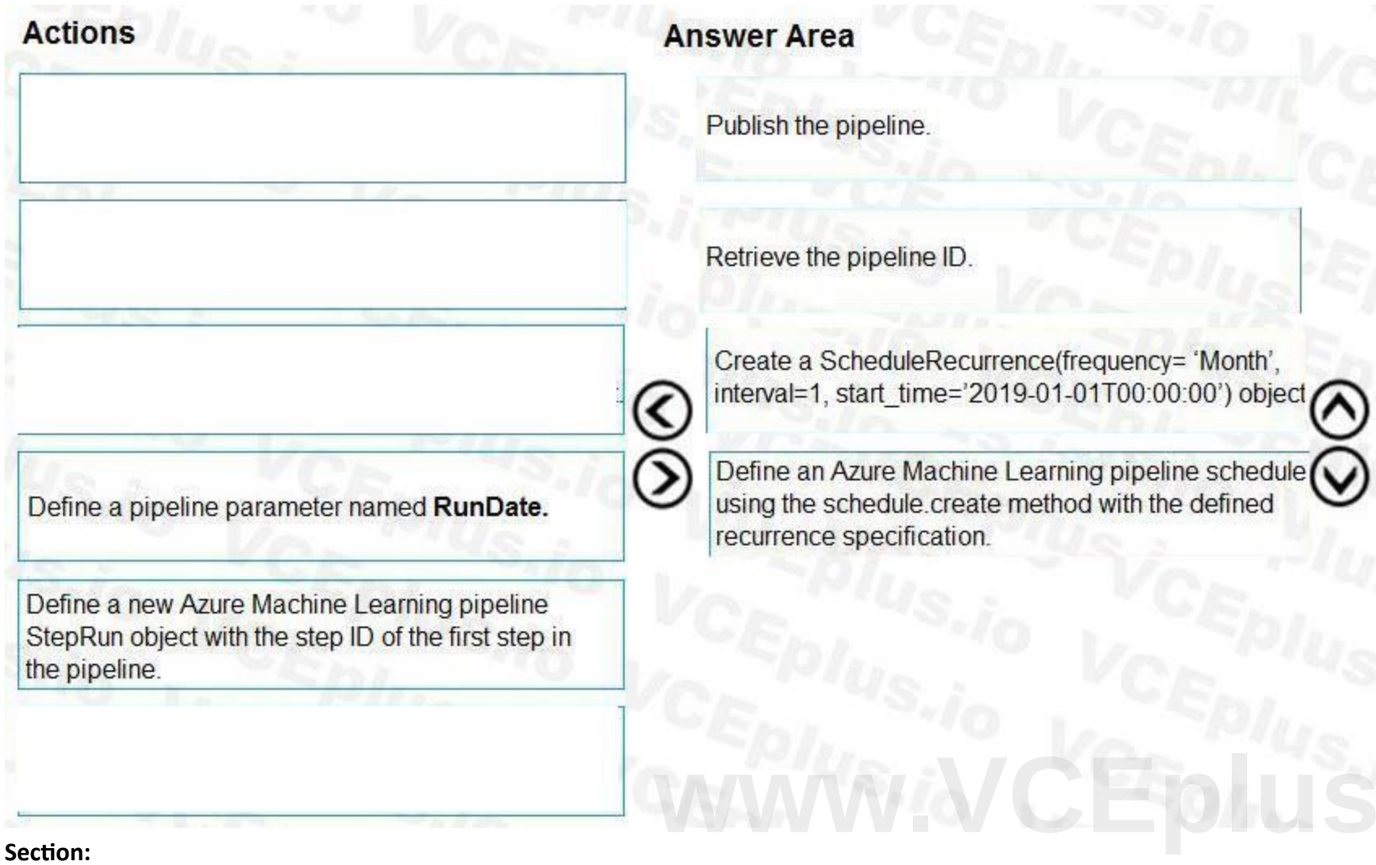
TabularDataset represents data in a tabular format created by parsing the provided file or list of files.
Note: TSV is a file extension for a tab-delimited file used with spreadsheet software. TSV stands for Tab Separated Values. TSV files are used for raw data and can be imported into and exported from spreadsheet software. TSV files are essentially text files, and the raw data can be viewed by text editors, though they are often used when moving raw data between spreadsheets.
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.data.tabulardataset

QUESTION 69
DRAG DROP
You create a multi-class image classification deep learning model.
The model must be retrained monthly with the new image data fetched from a public web portal. You create an Azure Machine Learning pipeline to fetch new data, standardize the size of images, and retrain the model.
You need to use the Azure Machine Learning SDK to configure the schedule for the pipeline.
Which four actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:
Explanation:
Step 1: Publish the pipeline.
To schedule a pipeline, you'll need a reference to your workspace, the identifier of your published pipeline, and the name of the experiment in which you wish to create the schedule.
Step 2: Retrieve the pipeline ID.
Needed for the schedule.
Step 3: Create a ScheduleRecurrence..
To run a pipeline on a recurring basis, you'll create a schedule. A Schedule associates a pipeline, an experiment, and a trigger.
First create a schedule. Example: Create a Schedule that begins a run every 15 minutes:
recurrence = ScheduleRecurrence(frequency="Minute", interval=15)
Step 4: Define an Azure Machine Learning pipeline schedule..
Example, continued:
recurring_schedule = Schedule.create(ws, name="MyRecurringSchedule",
description="Based on time",
pipeline_id=pipeline_id,
experiment_name=experiment_name,
recurrence=recurrence)
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-schedule-pipelines

QUESTION 70
HOTSPOT

You create a script for training a machine learning model in Azure Machine Learning service.
You create an estimator by running the following code:

```
from azureml.core import Workspace, Datastore
from azureml.core.compute import ComputeTarget
from azureml.train.estimator import Estimator
work_space = Workspace.from_config()
data_source = work_space.get_default_datastore()
train_cluster = ComputeTarget(workspace=work_space, name= 'train-cluster')
estimator = Estimator(source_directory =
 'training-experiment',
script_params = { ' --data-folder' : data_source.as_mount(), ' --regularization':0.8},
compute_target = train_cluster,
entry_script = 'train.py',
conda_packages = ['scikit-learn'])
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

	Yes	No
The estimator will look for the files it needs to run an experiment in the training-experiment directory of the local compute environment.	○	○
The estimator will mount the local data-folder folder and make it available to the script through a parameter.	○	○
The train.py script file will be created if it does not exist.	○	○
The estimator can run Scikit-learn experiments.	○	○

Answer Area:

Answer Area

	Yes	No
The estimator will look for the files it needs to run an experiment in the training-experiment directory of the local compute environment.	○	○
The estimator will mount the local data-folder folder and make it available to the script through a parameter.	○	○
The train.py script file will be created if it does not exist.	○	○
The estimator can run Scikit-learn experiments.	○	○

Section:
Explanation:
Box 1: Yes
Parameter source_directory is a local directory containing experiment configuration and code files needed for a training job.
Box 2: Yes
script_params is a dictionary of command-line arguments to pass to the training script specified in entry_script.
Box 3: No
Box 4: Yes
The conda_packages parameter is a list of strings representing conda packages to be added to the Python environment for the experiment.

QUESTION 71
HOTSPOT
You have a Python data frame named salesData in the following format:

	shop	2017	2018
0	Shop X	34	25
1	Shop Y	65	76
2	Shop Z	48	55

The data frame must be unpivoted to a long data format as follows:

	shop	year	value
0	Shop X	2017	34
1	Shop Y	2017	65
2	Shop Z	2017	48
3	Shop X	2018	25
4	Shop Y	2018	76
5	Shop Z	2018	55

You need to use the pandas.melt() function in Python to perform the transformation.
How should you complete the code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

```
import pandas as pd
salesData = pd.melt( [dataFrame | pandas | salesData | year] ,id_vars=' [shop | year | value | Shop X, Shop Y, Shop Z] ',value_vars= [‘shop’ | ‘year’ | [‘year’] | [‘2017’, ‘2018] ] )
```

Answer Area:

Answer Area

```
import pandas as pd
salesData = pd.melt( [dataFrame | pandas | salesData | year] ,id_vars=' [shop | year | value | Shop X, Shop Y, Shop Z] ',value_vars= [‘shop’ | ‘year’ | [‘year’] | [‘2017’, ‘2018] ] )
```

Section:

Explanation:

Box 1: dataFrame

Syntax: pandas.melt(frame, id_vars=None, value_vars=None, var_name=None, value_name='value', col_level=None)[source]

Where frame is a DataFrame

Box 2: shop

Paramter id_vars id_vars : tuple, list, or ndarray, optional

Column(s) to use as identifier variables.

Box 3: ['2017','2018']

value_vars : tuple, list, or ndarray, optional

Column(s) to unpivot. If not specified, uses all columns that are not set as id_vars.

Example:

df = pd.DataFrame({'A': {0: 'a', 1: 'b', 2: 'c'},

... 'B': {0: 1, 1: 3, 2: 5},

... 'C': {0: 2, 1: 4, 2: 6}})

pd.melt(df, id_vars=['A'], value_vars=['B', 'C'])

A variable value

0 a B 1

1 b B 3

2 c B 5

3 a C 2

4 b C 4

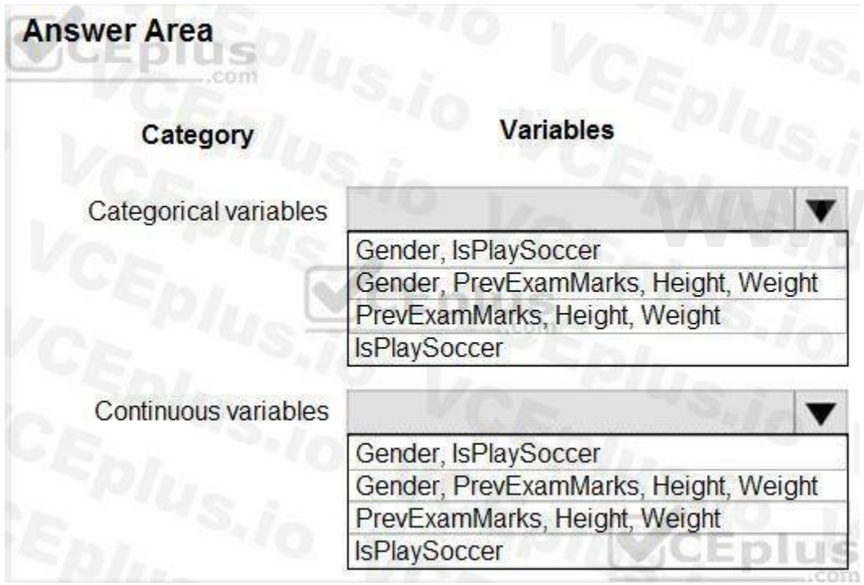
5 c C 6
References:
https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.melt.html

QUESTION 72
HOTSPOT
You are working on a classification task. You have a dataset indicating whether a student would like to play soccer and associated attributes. The dataset includes the following columns:

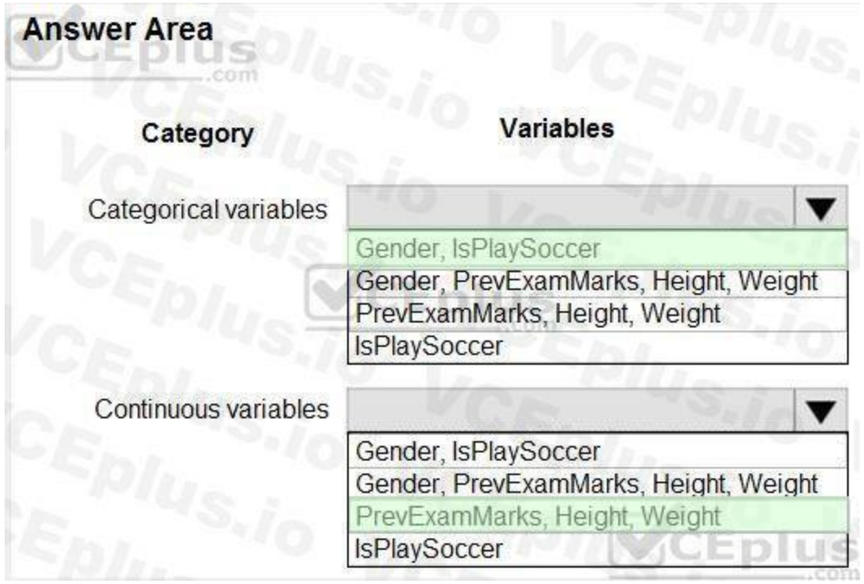
Name	Description
IsPlaySoccer	Values can be 1 and 0.
Gender	Values can be M or F.
PrevExamMarks	Stores values from 0 to 100
Height	Stores values in centimeters
Weight	Stores values in kilograms

You need to classify variables by type.
Which variable should you add to each category? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



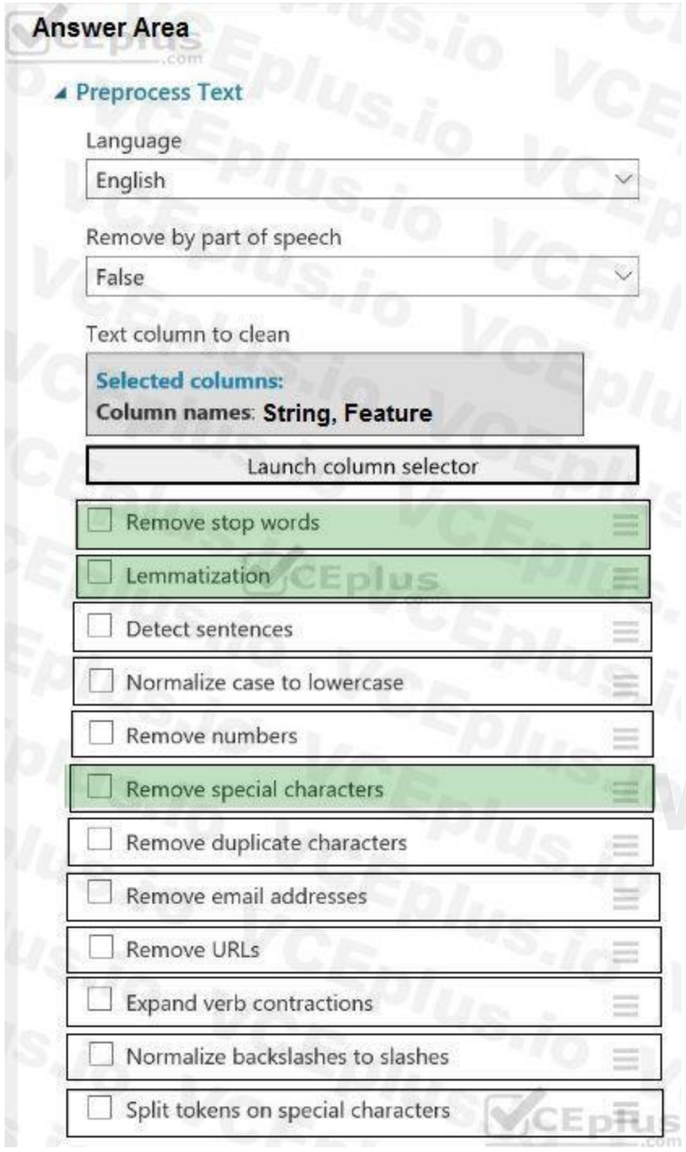
Answer Area:



Section:
Explanation:
References:
https://www.edureka.co/blog/classification-algorithms/

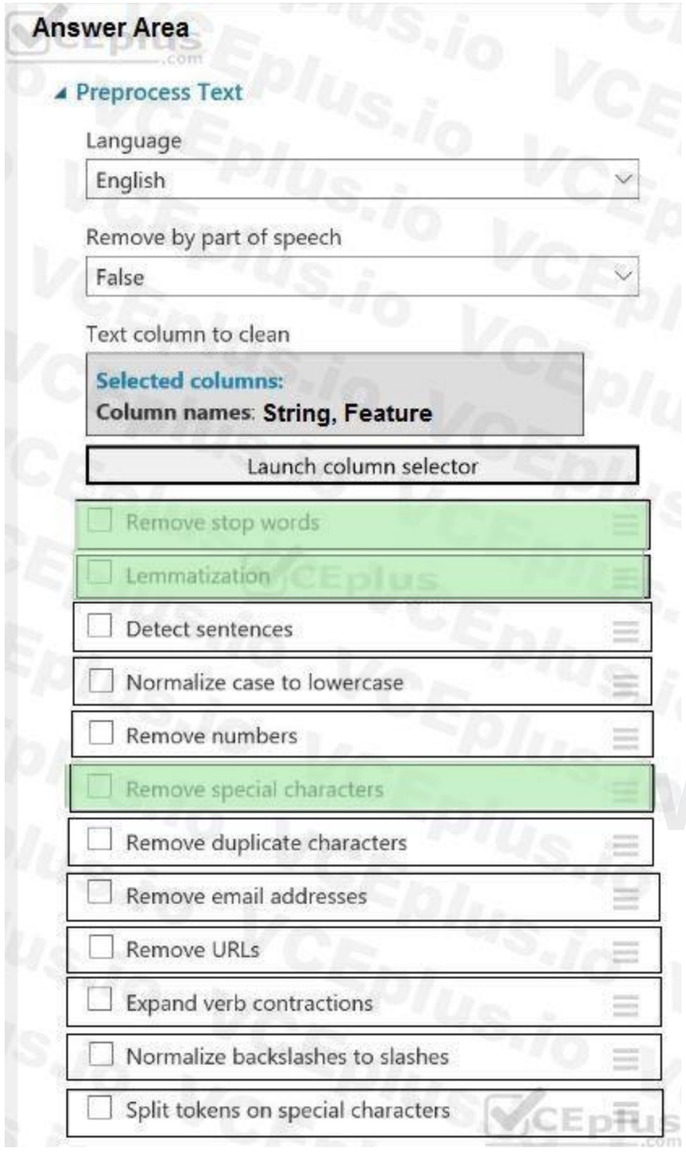
QUESTION 73
HOTSPOT
You plan to preprocess text from CSV files. You load the Azure Machine Learning Studio default stop words list.
You need to configure the Preprocess Text module to meet the following requirements:
Ensure that multiple related words from a single canonical form.
Remove pipe characters from text.
Remove words to optimize information retrieval.
Which three options should you select? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

Answer Area



Section:

Explanation:

Box 1: Remove stop words

Remove words to optimize information retrieval.

Remove stop words: Select this option if you want to apply a predefined stopword list to the text column. Stop word removal is performed before any other processes.

Box 2: Lemmatization

Ensure that multiple related words from a single canonical form.

Lemmatization converts multiple related words to a single canonical form

Box 3: Remove special characters

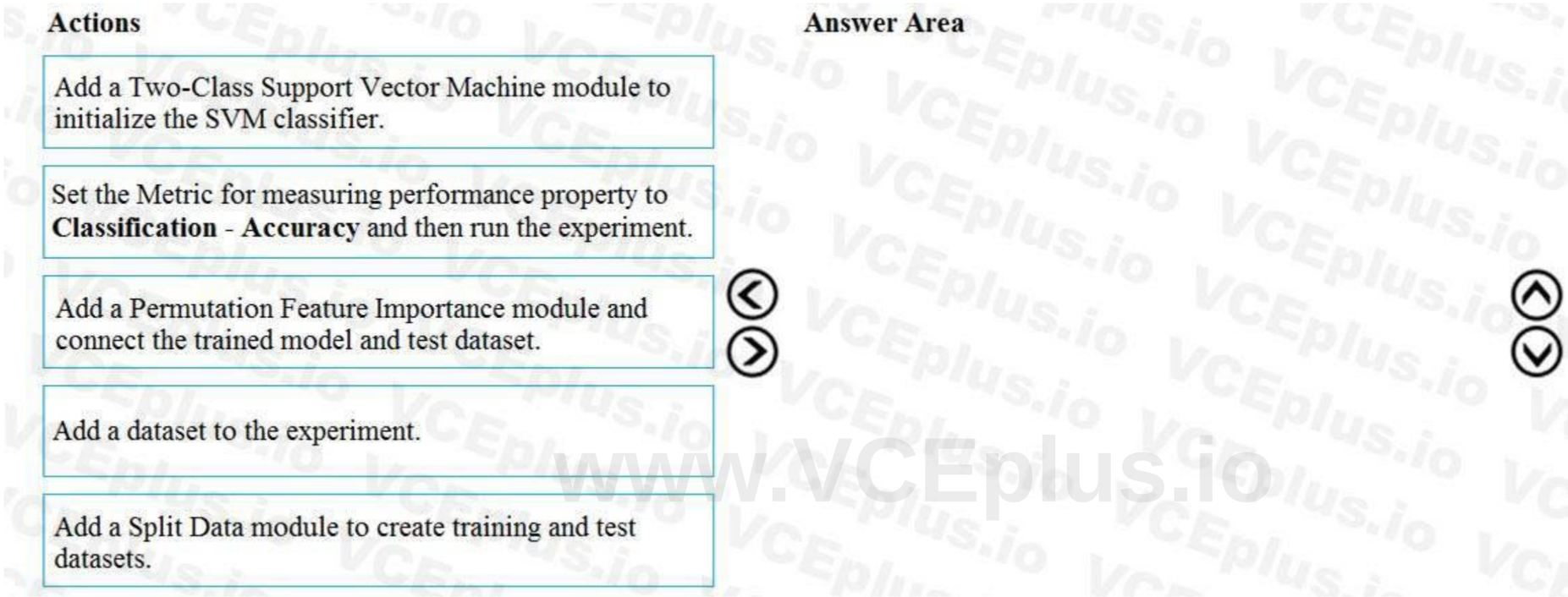
Remove special characters: Use this option to replace any non-alphanumeric special characters with the pipe | character.

References:

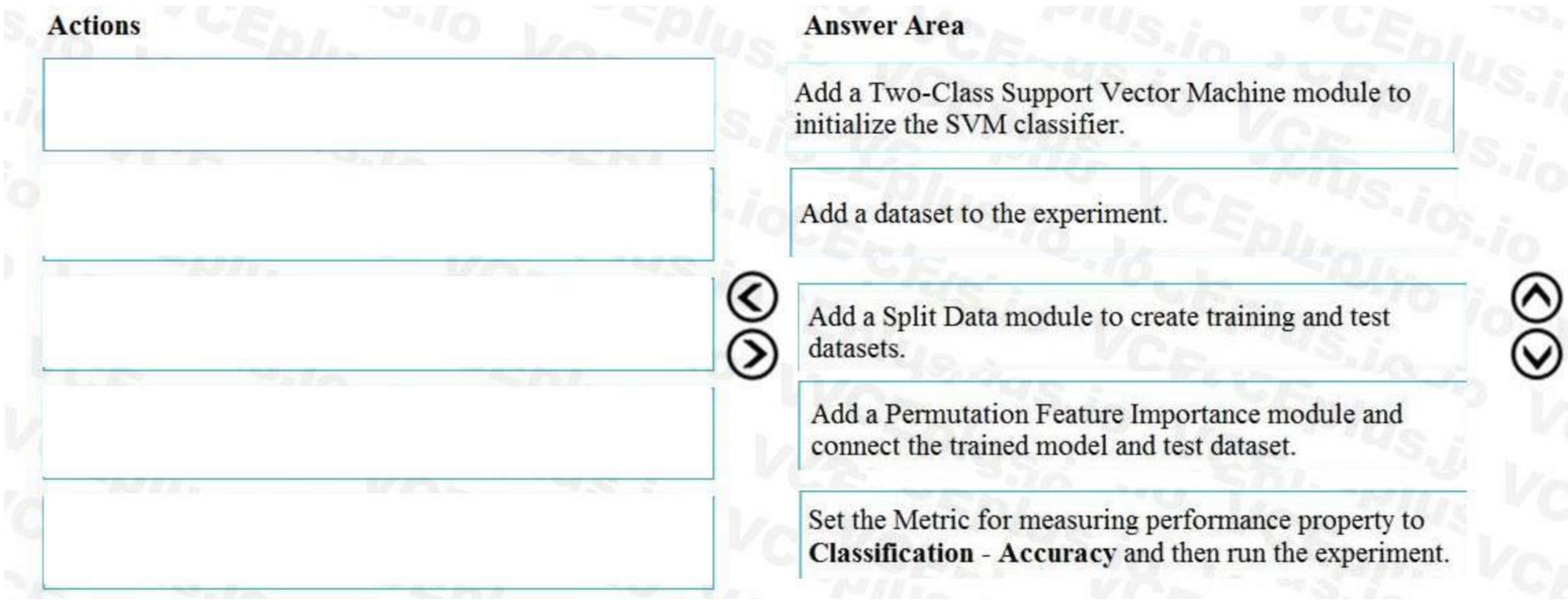
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/preprocess-text

QUESTION 74
DRAG DROP
You have a dataset that contains over 150 features. You use the dataset to train a Support Vector Machine (SVM) binary classifier.
You need to use the Permutation Feature Importance module in Azure Machine Learning Studio to compute a set of feature importance scores for the dataset.
In which order should you perform the actions? To answer, move all actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:
Explanation:
Step 1: Add a Two-Class Support Vector Machine module to initialize the SVM classifier.
Step 2: Add a dataset to the experiment
Step 3: Add a Split Data module to create training and test dataset.
To generate a set of feature scores requires that you have an already trained model, as well as a test dataset.
Step 4: Add a Permutation Feature Importance module and connect to the trained model and test dataset.
Step 5: Set the Metric for measuring performance property to Classification - Accuracy and then run the experiment.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/two-class-support-vector-machine
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/permutation-feature-importance

QUESTION 75
HOTSPOT
You are using the Hyperdrive feature in Azure Machine Learning to train a model.
You configure the Hyperdrive experiment by running the following code:

```
from azureml.train.hyperdrive import RandomParameterSampling
param_sampling = RandomParameterSampling( {
      "learning_rate": normal(10, 3),
      "keep_probability": uniform(0.05, 0.1),
      "batch_size": choice(16, 32, 64, 128)
      "number_of_hidden_layers": choice(range(3,5))
  }
)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

	Yes	No
By defining sampling in this manner, every possible combination of the parameters will be tested.	○	○
Random values of the learning_rate parameter will be selected from a normal distribution with a mean of 10 and a standard deviation of 3.	○	○
The keep_probability parameter value will always be either **0.05** or **0.1**.	○	○
Random values for the number_of_hidden_layers parameter will be selected from a normal distribution with a mean of 3 and a standard deviation of 5.	○	○

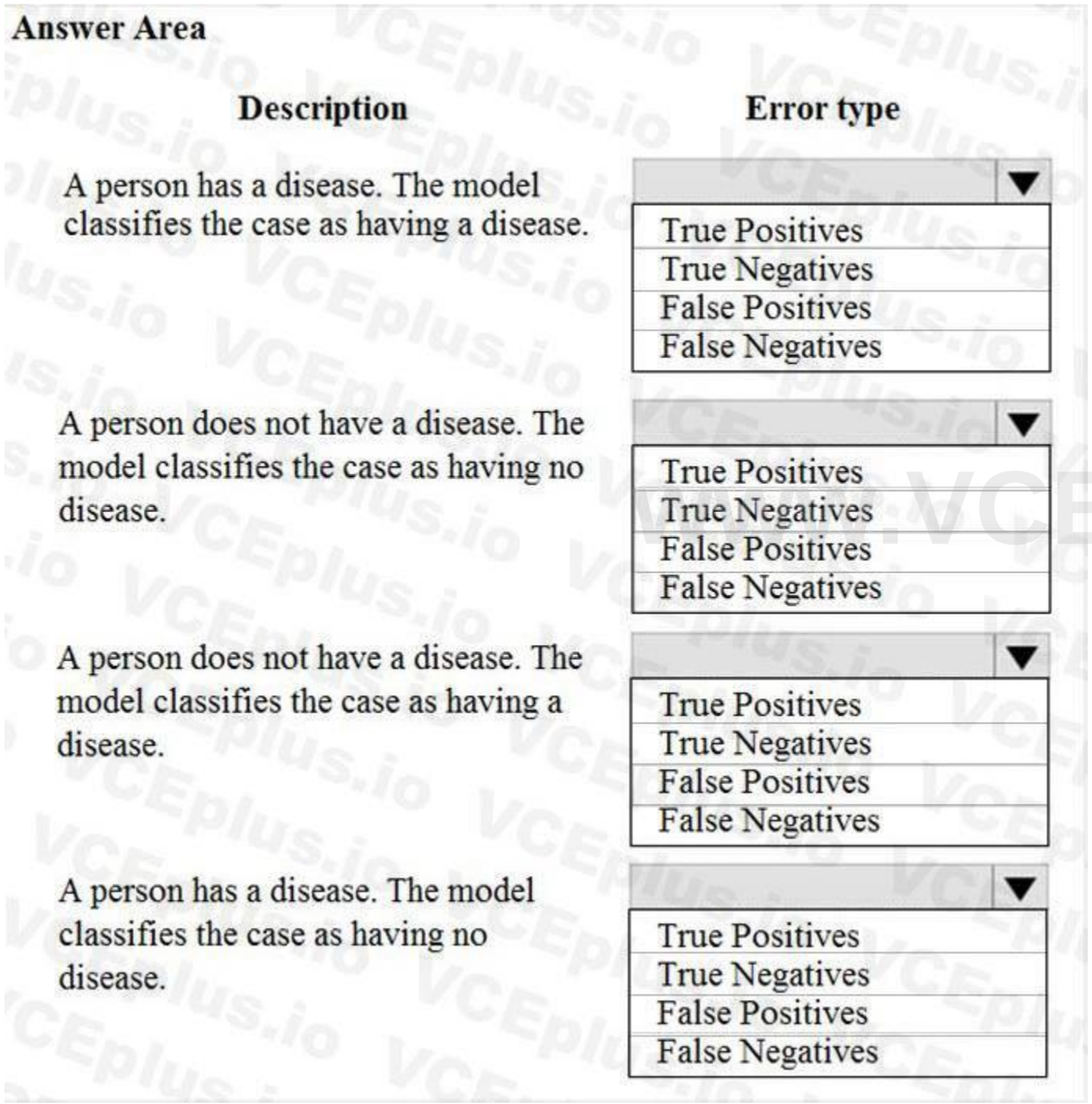
Answer Area:

	Yes	No
By defining sampling in this manner, every possible combination of the parameters will be tested.	○	○
Random values of the learning_rate parameter will be selected from a normal distribution with a mean of 10 and a standard deviation of 3.	○	○
The keep_probability parameter value will always be either **0.05** or **0.1**.	○	○
Random values for the number_of_hidden_layers parameter will be selected from a normal distribution with a mean of 3 and a standard deviation of 5.	○	○

Section:
Explanation:
Box 1: Yes
In random sampling, hyperparameter values are randomly selected from the defined search space. Random sampling allows the search space to include both discrete and continuous hyperparameters.
Box 2: Yes
learning_rate has a normal distribution with mean value 10 and a standard deviation of 3.
Box 3: No
keep_probability has a uniform distribution with a minimum value of 0.05 and a maximum value of 0.1.
Box 4: No
number_of_hidden_layers takes on one of the values [3, 4, 5].
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-tune-hyperparameters

QUESTION 76
HOTSPOT
You create a binary classification model to predict whether a person has a disease.
You need to detect possible classification errors.
Which error type should you choose for each description? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

Answer Area

Description	Error type
A person has a disease. The model classifies the case as having a disease.	True Positives
A person does not have a disease. The model classifies the case as having no disease.	True Negatives
A person does not have a disease. The model classifies the case as having a disease.	False Positives
A person has a disease. The model classifies the case as having no disease.	False Negatives

Section:

Explanation:

Box 1: True Positive

A true positive is an outcome where the model correctly predicts the positive class

Box 2: True Negative

A true negative is an outcome where the model correctly predicts the negative class.

Box 3: False Positive

A false positive is an outcome where the model incorrectly predicts the positive class.

Box 4: False Negative

A false negative is an outcome where the model incorrectly predicts the negative class.

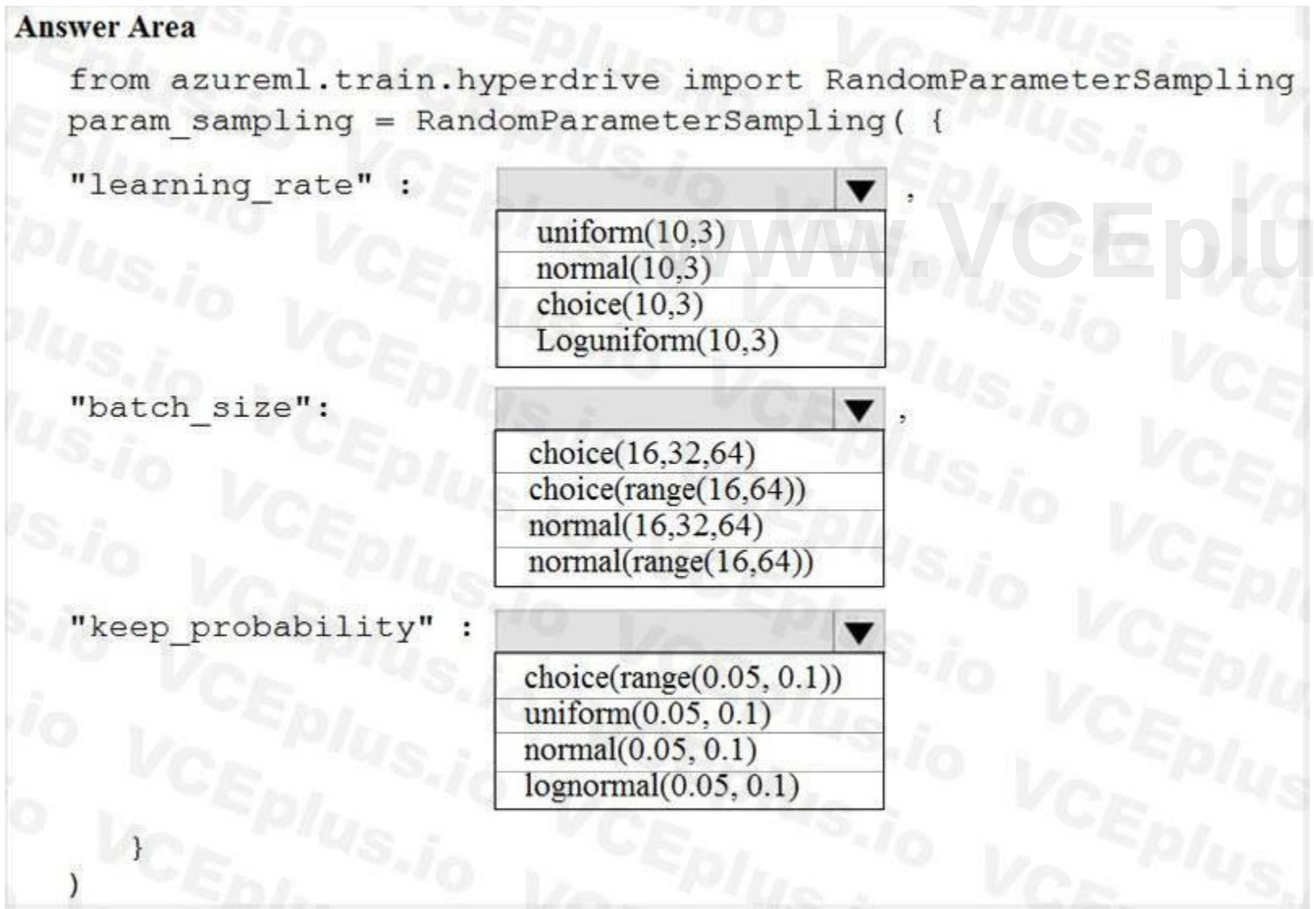
Note: Let's make the following definitions:

"Wolf" is a positive class.

"No wolf" is a negative class.
We can summarize our "wolf-prediction" model using a 2x2 confusion matrix that depicts all four possible outcomes:
Reference:
https://developers.google.com/machine-learning/crash-course/classification/true-false-positive-negative

QUESTION 77
HOTSPOT
You are using the Azure Machine Learning Service to automate hyperparameter exploration of your neural network classification model.
You must define the hyperparameter space to automatically tune hyperparameters using random sampling according to following requirements:
The learning rate must be selected from a normal distribution with a mean value of 10 and a standard deviation of 3.
Batch size must be 16, 32 and 64.
Keep probability must be a value selected from a uniform distribution between the range of 0.05 and 0.1.
You need to use the param_sampling method of the Python API for the Azure Machine Learning Service.
How should you complete the code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

Answer Area

```
from azureml.train.hyperdrive import RandomParameterSampling
param_sampling = RandomParameterSampling( {
"learning_rate" : [          ▼] ,
"batch_size":    [          ▼] ,
"keep_probability" : [      ▼]
    }
)
```

"learning_rate" :
- uniform(10,3)
- normal(10,3)
- choice(10,3)
- Loguniform(10,3)

"batch_size":
- choice(16,32,64)
- choice(range(16,64))
- normal(16,32,64)
- normal(range(16,64))

"keep_probability" :
- choice(range(0.05, 0.1))
- uniform(0.05, 0.1)
- normal(0.05, 0.1)
- lognormal(0.05, 0.1)

Section:

Explanation:

In random sampling, hyperparameter values are randomly selected from the defined search space. Random sampling allows the search space to include both discrete and continuous hyperparameters.

Example:

```
from azureml.train.hyperdrive import RandomParameterSampling
param_sampling = RandomParameterSampling( {
"learning_rate": normal(10, 3),
"keep_probability": uniform(0.05, 0.1),
"batch_size": choice(16, 32, 64)
}
```

Reference:

https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-tune-hyperparameters

QUESTION 78

DRAG DROP

You create a training pipeline using the Azure Machine Learning designer. You upload a CSV file that contains the data from which you want to train your model.

You need to use the designer to create a pipeline that includes steps to perform the following tasks:

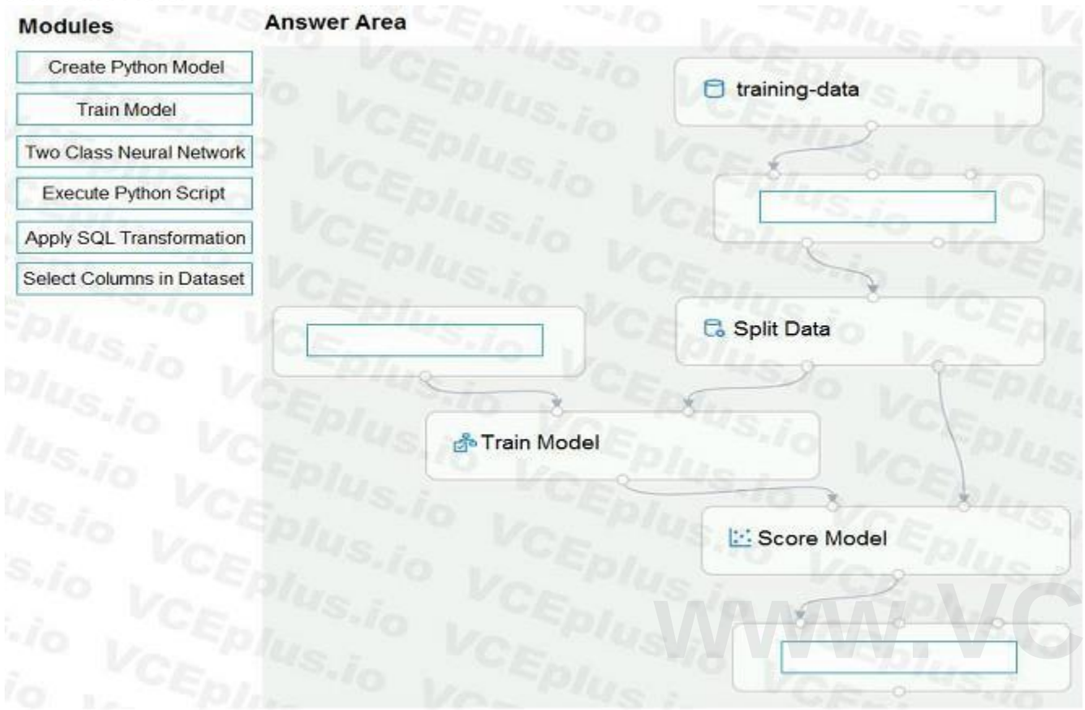
Select the training features using the pandas filter method.

Train a model based on the naive_bayes.GaussianNB algorithm.

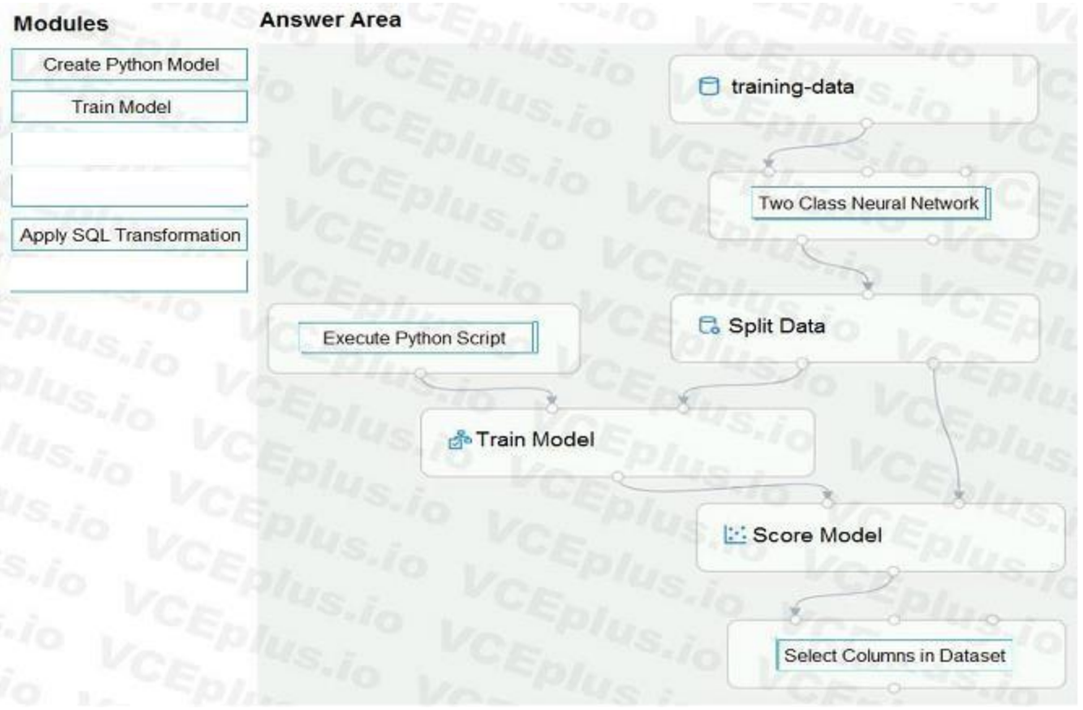
Return only the Scored Labels column by using the query SELECT [Scored Labels] FROM t1;

Which modules should you use? To answer, drag the appropriate modules to the appropriate locations. Each module name may be used once, more than once, or not at all. You may need to drag the split bar between panes or scroll to view content.
NOTE: Each correct selection is worth one point.

Select and Place:



Correct Answer:



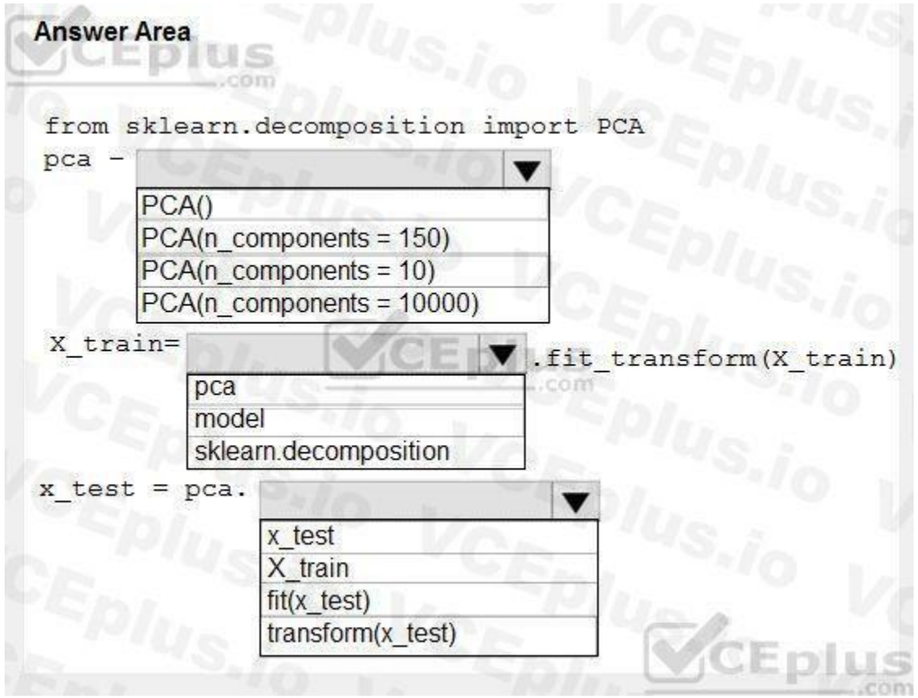
Section:
Explanation:
Box 1: Two-Class Neural Network
The Two-Class Neural Network creates a binary classifier using a neural network algorithm.
Train a model based on the naive_bayes.GaussianNB algorithm.
Box 2: Execute python script
Select the training features using the pandas filter method
Box 3: Select Columns in DataSet
Return only the Scored Labels column by using the query SELECT [Scored Labels] FROM t1;
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/two-class-neural-network

QUESTION 79
HOTSPOT
You have a dataset created for multiclass classification tasks that contains a normalized numerical feature set with 10,000 data points and 150 features.
You use 75 percent of the data points for training and 25 percent for testing. You are using the scikit-learn machine learning library in Python. You use X to denote the feature set and Y to denote class labels.
You create the following Python data frames:

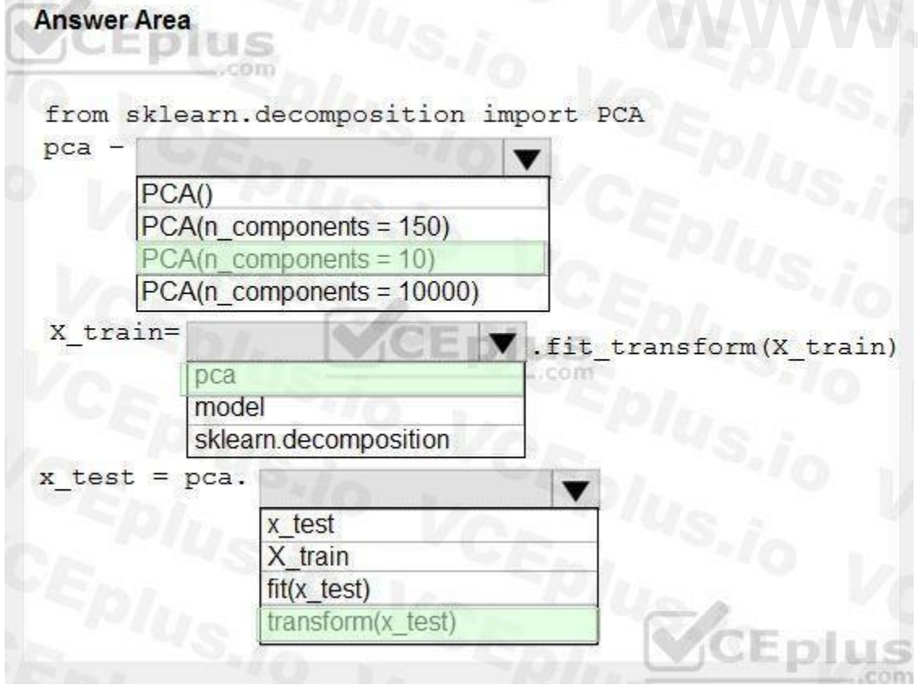
Name	Description
X_train	training feature set
Y_train	training class labels
x_train	testing feature set
y_train	testing class labels

You need to apply the Principal Component Analysis (PCA) method to reduce the dimensionality of the feature set to 10 features in both training and testing sets.
How should you complete the code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:



Section:
Explanation:

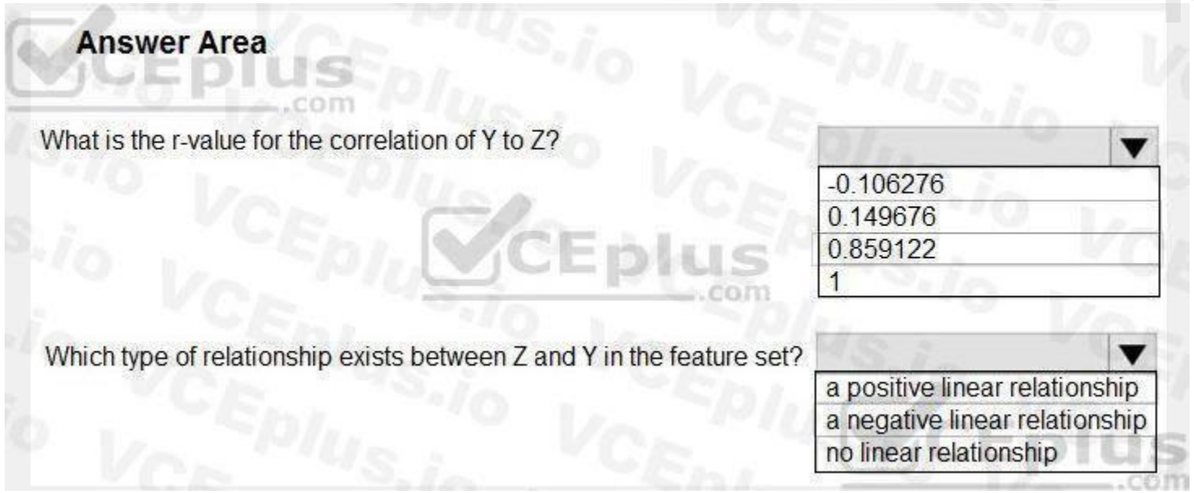
Box 1: PCA(n_components = 10)
Need to reduce the dimensionality of the feature set to 10 features in both training and testing sets.
Example:
from sklearn.decomposition import PCA
pca = PCA(n_components=2) ;2 dimensions
principalComponents = pca.fit_transform(x)
Box 2: pca
fit_transform(X[, y])fits the model with X and apply the dimensionality reduction on X.
Box 3: transform(x_test)
transform(X) applies dimensionality reduction to X.
References:
https://scikit-learn.org/stable/modules/generated/sklearn.decomposition.PCA.html

QUESTION 80
HOTSPOT
You have a feature set containing the following numerical features: X, Y, and Z.
The Poisson correlation coefficient (r-value) of X, Y, and Z features is shown in the following image:

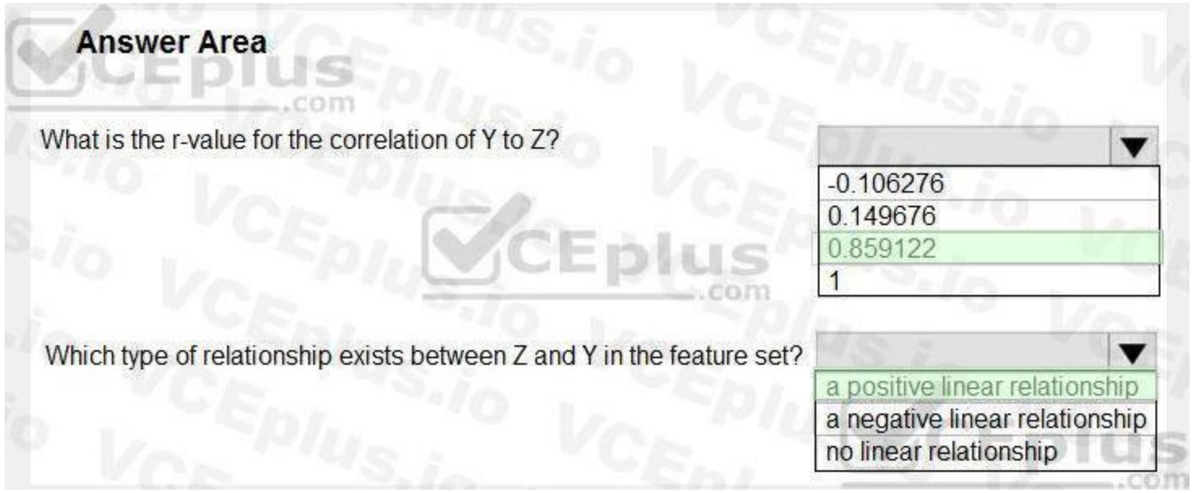
	X	Y	Z
X	1	0.149676	-0.106276
Y	0.149676	1	0.859122
Z	-0.106276	0.859122	1

Use the drop-down menus to select the answer choice that answers each question based on the information presented in the graphic.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:



Section:
Explanation:
Box 1: 0.859122
Box 2: a positively linear relationship +1 indicates a strong positive linear relationship
-1 indicates a strong negative linear correlation
0 denotes no linear relationship between the two variables.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/compute-linear-correlation

QUESTION 81
DRAG DROP
You plan to explore demographic data for home ownership in various cities. The data is in a CSV file with the following format:
age,city,income,home_owner
21,Chicago,50000,0
35,Seattle,120000,1
23,Seattle,65000,0
45,Seattle,130000,1
18,Chicago,48000,0
You need to run an experiment in your Azure Machine Learning workspace to explore the data and log the results. The experiment must log the following information:
the number of observations in the dataset
a box plot of income by home_owner
a dictionary containing the city names and the average income for each city
You need to use the appropriate logging methods of the experiment's run object to log the required information.
How should you complete the code? To answer, drag the appropriate code segments to the correct locations. Each code segment may be used once, more than once, or not at all. You may need to drag the split bar between panes or scroll to view content.
NOTE: Each correct selection is worth one point.

Select and Place:

Code segments

- log
- log_list
- log_row
- log_table
- log_image

Answer Area

```
from azureml.core import Experiment, Run
import pandas as pd
import matplotlib.pyplot as plt
# Create an Azure ML experiment in workspace
experiment = Experiment(workspace = ws, name = "demo-experiment")
# Start logging data from the experiment
run = experiment.start_logging()
# load the dataset
data = pd.read_csv('research/demographics.csv')
# Log the number of observations
row_count = (len(data))
run. Segment ("observations", row_count)
# Log box plot for income by home_owner
fig = plt.figure(figsize=(9, 6))
ax = fig.gca()
data.boxplot(column = 'income', by = "home_owner", ax = ax)
ax.set_title('income by home_owner')
ax.set_ylabel('income')
run. Segment (name = 'income_by_home_owner', plot = fig)
# Create a dataframe of mean income per city
mean_inc_df = data.groupby('city')['income'].agg(np.mean).to_frame().reset_index()
# Convert to a dictionary
mean_inc_dict = mean_inc_df.to_dict('dict')
# Log city names and average income dictionary
run. Segment (name="mean_income_by_city", value= mean_inc_dict)
# Complete tracking and get link to details
run.complete()
```

Correct Answer:

Code segments

- log_list
- log_row

Answer Area

```
from azureml.core import Experiment, Run
import pandas as pd
import matplotlib.pyplot as plt
# Create an Azure ML experiment in workspace
experiment = Experiment(workspace = ws, name = "demo-experiment")
# Start logging data from the experiment
run = experiment.start_logging()
# load the dataset
data = pd.read_csv('research/demographics.csv')
# Log the number of observations
row_count = (len(data))
run. log ("observations", row_count)
# Log box plot for income by home_owner
fig = plt.figure(figsize=(9, 6))
ax = fig.gca()
data.boxplot(column = 'income', by = "home_owner", ax = ax)
ax.set_title('income by home_owner')
ax.set_ylabel('income')
run. log_image (name = 'income_by_home_owner', plot = fig)
# Create a dataframe of mean income per city
mean_inc_df = data.groupby('city')['income'].agg(np.mean).to_frame().reset_index()
# Convert to a dictionary
mean_inc_dict = mean_inc_df.to_dict('dict')
# Log city names and average income dictionary
run. log_table (name="mean_income_by_city", value= mean_inc_dict)
# Complete tracking and get link to details
run.complete()
```


Section:

Explanation:

Box 1: log

The number of observations in the dataset.

run.log(name, value, description='')

Scalar values: Log a numerical or string value to the run with the given name. Logging a metric to a run causes that metric to be stored in the run record in the experiment. You can log the same metric multiple times within a run, the result being considered a vector of that metric.
Example: run.log("accuracy", 0.95)
Box 2: log_image
A box plot of income by home_owner.
log_image Log an image to the run record. Use log_image to log a .PNG image file or a matplotlib plot to the run. These images will be visible and comparable in the run record.
Example: run.log_image("ROC", plot=plt)
Box 3: log_table
A dictionary containing the city names and the average income for each city.
log_table: Log a dictionary object to the run with the given name.

QUESTION 82
HOTSPOT
Your Azure Machine Learning workspace has a dataset named real_estate_data. A sample of the data in the dataset follows.

postal_code	num_bedrooms	sq_feet	garage	price
12345	3	1300	0	23,9000
54321	1	950	0	11,0000
12346	2	1200	1	15,0000

You want to use automated machine learning to find the best regression model for predicting the price column.
You need to configure an automated machine learning experiment using the Azure Machine Learning SDK.
How should you complete the code? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

```
from azureml.core import Workspace
from azureml.core.compute import ComputeTarget
from azureml.core.runconfig import RunConfiguration
from azureml.train.automl import AutoMLConfig

ws = Workspace.from_config()
training_cluster = ComputeTarget(workspace=ws, name= 'aml-cluster1')
real_estate_ds = ws.datasets.get('real_estate_data')
split1_ds, split2_ds = real_estate_ds.random_split(percentage=0.7, seed=123)
automl_run_config = RunConfiguration(framework= "python")
automl_config = AutoMLConfig(        task= 'regression',
                                     compute_target= training_cluster,
                                     run_configuration=automl_run_config,
                                     primary_metric='r2_score',
                                     [ ▼ ]=split1_ds,
                                     [ ▼ ]=split2_ds
                                     [ ▼ ]='price')
```

X
Y
X_valid
Y_valid
training_data

X
Y
X_valid
Y_valid
validation_data
training_data

y
y_valid
y_max
label_column_name
exclude_nan_labels

Answer Area:

Answer Area

```
from azureml.core import Workspace
from azureml.core.compute import ComputeTarget
from azureml.core.runconfig import RunConfiguration
from azureml.train.automl import AutoMLConfig

ws = Workspace.from_config()
training_cluster = ComputeTarget(workspace=ws, name= 'aml-cluster1')
real_estate_ds = ws.datasets.get('real_estate_data')
split1_ds, split2_ds = real_estate_ds.random_split(percentage=0.7, seed=123)
automl_run_config = RunConfiguration(framework= "python")
automl_config = AutoMLConfig(          task= 'regression',
                                       compute_target= training_cluster,
                                       run_configuration=automl_run_config,
                                       primary_metric='r2_score',
                                       [ ▼ ]=split1_ds,
                                       [ ▼ ]=split2_ds
                                       [ ▼ ]='price')
```

X
Y
X_valid
Y_valid
training_data

X
Y
X_valid
Y_valid
validation_data
training_data

y
y_valid
y_max
label_column_name
exclude_nan_labels

Section:

Explanation:

Box 1: training_data The training data to be used within the experiment. It should contain both training features and a label column (optionally a sample weights column). If training_data is specified, then the label_column_name parameter must also be specified.

Box 2: validation_data Provide validation data: In this case, you can either start with a single data file and split it into training and validation sets or you can provide a separate data file for the validation set. Either way, the validation_data parameter in your

AutoMLConfig object assigns which data to use as your validation set.

Example, the following code example explicitly defines which portion of the provided data in dataset to use for training and validation.

dataset = Dataset.Tabular.from_delimited_files(data)

training_data, validation_data = dataset.random_split(percentage=0.8, seed=1)

```
automl_config = AutoMLConfig(compute_target = aml_remote_compute,
task = 'classification',
primary_metric = 'AUC_weighted',
training_data = training_data,
validation_data = validation_data,
label_column_name = 'Class'
)
```

Box 3: label_column_name

label_column_name:

The name of the label column. If the input data is from a pandas.DataFrame which doesn't have column names, column indices can be used instead, expressed as integers.

This parameter is applicable to training_data and validation_data parameters.

Incorrect Answers:

X: The training features to use when fitting pipelines during an experiment. This setting is being deprecated. Please use training_data and label_column_name instead.

Y: The training labels to use when fitting pipelines during an experiment. This is the value your model will predict. This setting is being deprecated. Please use training_data and label_column_name instead.

X_valid: Validation features to use when fitting pipelines during an experiment.

If specified, then y_valid or sample_weight_valid must also be specified.

Y_valid: Validation labels to use when fitting pipelines during an experiment.

Both X_valid and y_valid must be specified together.

exclude_nan_labels: Whether to exclude rows with NaN values in the label. The default is True.

y_max: y_max (float)

Maximum value of y for a regression experiment. The combination of y_min and y_max are used to normalize test set metrics based on the input data range. If not specified, the maximum value is inferred from the data.

Reference:

https://docs.microsoft.com/en-us/python/api/azureml-train-automl-client/azureml.train.automl.automlconfig.automlconfig?view=azure-ml-py

02 - Run experiments and train models

Case study

Overview

You are a data scientist in a company that provides data science for professional sporting events. Models will use global and local market data to meet the following business goals:

Understand sentiment of mobile device users at sporting events based on audio from crowd reactions.

Assess a user's tendency to respond to an advertisement.

Customize styles of ads served on mobile devices.

Use video to detect penalty events

Current environment

Media used for penalty event detection will be provided by consumer devices. Media may include images and videos captured during the sporting event and shared using social media. The images and videos will have varying sizes and formats.

The data available for model building comprises of seven years of sporting event media. The sporting event media includes; recorded video transcripts or radio commentary, and logs from related social media feeds captured during the sporting events.

Crowd sentiment will include audio recordings submitted by event attendees in both mono and stereo formats.

Penalty detection and sentiment

Data scientists must build an intelligent solution by using multiple machine learning models for penalty event detection.

Data scientists must build notebooks in a local environment using automatic feature engineering and model building in machine learning pipelines.

Notebooks must be deployed to retrain by using Spark instances with dynamic worker allocation.

Notebooks must execute with the same code on new Spark instances to recode only the source of the data.

Global penalty detection models must be trained by using dynamic runtime graph computation during training.

Local penalty detection models must be written by using BrainScript.

Experiments for local crowd sentiment models must combine local penalty detection data.

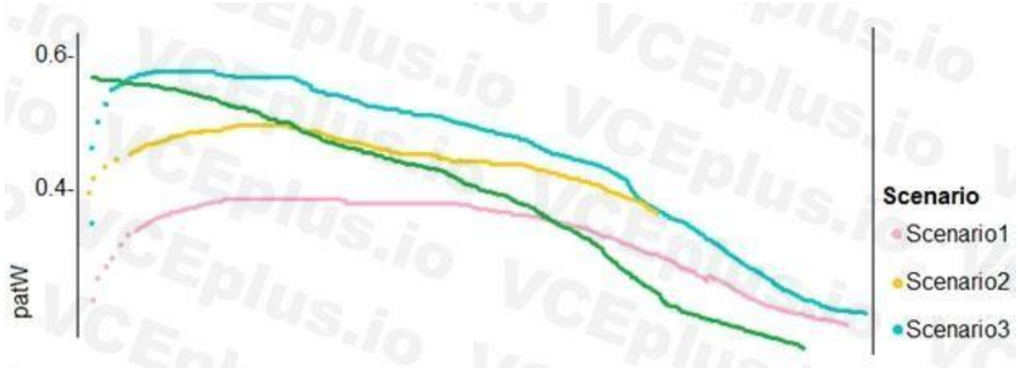
Crowd sentiment models must identify known sounds such as cheers and known catch phrases. Individual crowd sentiment models will detect similar sounds.
All shared features for local models are continuous variables.
Shared features must use double precision. Subsequent layers must have aggregate running mean and standard deviation metrics available.
Advertisements
During the initial weeks in production, the following was observed:
Ad response rated declined.
Drops were not consistent across ad styles.
The distribution of features across training and production data are not consistent
Analysis shows that, of the 100 numeric features on user location and behavior, the 47 features that come from location sources are being used as raw features. A suggested experiment to remedy the bias and variance issue is to engineer 10 linearly uncorrelated features.
Initial data discovery shows a wide range of densities of target states in training data used for crowd sentiment models.
All penalty detection models show inference phases using a Stochastic Gradient Descent (SGD) are running too slow.
Audio samples show that the length of a catch phrase varies between 25%-47% depending on region The performance of the global penalty detection models shows lower variance but higher bias when comparing training and validation sets. Before implementing any feature changes, you must confirm the bias and variance using all training and validation cases.
Ad response models must be trained at the beginning of each event and applied during the sporting event.
Market segmentation models must optimize for similar ad response history.
Sampling must guarantee mutual and collective exclusively between local and global segmentation models that share the same features.
Local market segmentation models will be applied before determining a user's propensity to respond to an advertisement.
Ad response models must support non-linear boundaries of features.
The ad propensity model uses a cut threshold is 0.45 and retrains occur if weighted Kappa deviated from 0.1 +/- 5%.
The ad propensity model uses cost factors shown in the following diagram:

		Actual	
		1	0
Predicted	0	1	2
	1	2	1

The ad propensity model uses proposed cost factors shown in the following diagram:

		Actual	
		1	0
Predicted	0	1	5
	1	5	1

Performance curves of current and proposed cost factor scenarios are shown in the following diagram:



QUESTION 1
You need to implement a scaling strategy for the local penalty detection data.
Which normalization type should you use?

A. Streaming
B. Weight
C. Batch
D. Cosine

Correct Answer: C
Section:
Explanation:
Post batch normalization statistics (PBN) is the Microsoft Cognitive Toolkit (CNTK) version of how to evaluate the population mean and variance of Batch Normalization which could be used in inference Original Paper.
In CNTK, custom networks are defined using the BrainScriptNetworkBuilder and described in the CNTK network description language "BrainScript." Scenario:
Local penalty detection models must be written by using BrainScript.
Reference:
https://docs.microsoft.com/en-us/cognitive-toolkit/post-batch-normalization-statistics

QUESTION 2
You need to implement a feature engineering strategy for the crowd sentiment local models.
What should you do?

A. Apply an analysis of variance (ANOVA).
B. Apply a Pearson correlation coefficient.
C. Apply a Spearman correlation coefficient.
D. Apply a linear discriminant analysis.

Correct Answer: D
Section:
Explanation:
The linear discriminant analysis method works only on continuous variables, not categorical or ordinal variables.
Linear discriminant analysis is similar to analysis of variance (ANOVA) in that it works by comparing the means of the variables.
Scenario:

Data scientists must build notebooks in a local environment using automatic feature engineering and model building in machine learning pipelines. Experiments for local crowd sentiment models must combine local penalty detection data. All shared features for local models are continuous variables.
Incorrect Answers:
B: The Pearson correlation coefficient, sometimes called Pearson's R test, is a statistical value that measures the linear relationship between two variables. By examining the coefficient values, you can infer something about the strength of the relationship between the two variables, and whether they are positively correlated or negatively correlated.
C: Spearman's correlation coefficient is designed for use with non-parametric and non-normally distributed data. Spearman's coefficient is a nonparametric measure of statistical dependence between two variables, and is sometimes denoted by the Greek letter rho. The Spearman's coefficient expresses the degree to which two variables are monotonically related. It is also called Spearman rank correlation, because it can be used with ordinal variables.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/fisher-linear-discriminant-analysis https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/compute-linear-correlation

QUESTION 3
You need to implement a model development strategy to determine a user's tendency to respond to an ad.
Which technique should you use?

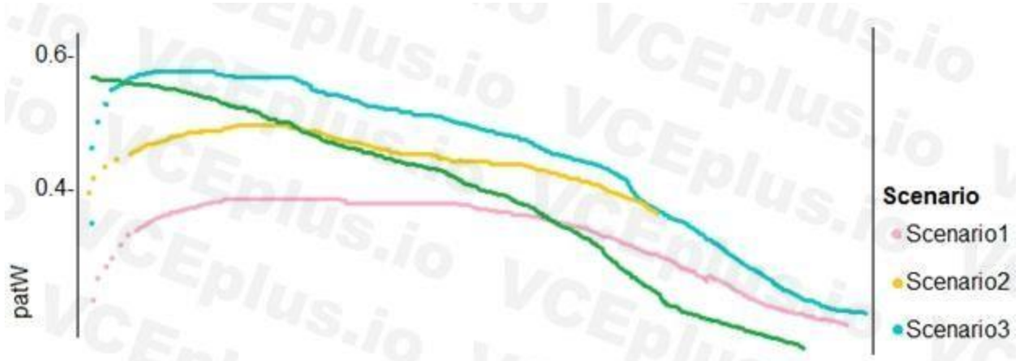
A. Use a Relative Expression Split module to partition the data based on centroid distance.
B. Use a Relative Expression Split module to partition the data based on distance travelled to the event.
C. Use a Split Rows module to partition the data based on distance travelled to the event.
D. Use a Split Rows module to partition the data based on centroid distance.

Correct Answer: A
Section:
Explanation:
Split Data partitions the rows of a dataset into two distinct sets.
The Relative Expression Split option in the Split Data module of Azure Machine Learning Studio is helpful when you need to divide a dataset into training and testing datasets using a numerical expression.
Relative Expression Split: Use this option whenever you want to apply a condition to a number column. The number could be a date/time field, a column containing age or dollar amounts, or even a percentage. For example, you might want to divide your data set depending on the cost of the items, group people by age ranges, or separate data by a calendar date.
Scenario:
Local market segmentation models will be applied before determining a user's propensity to respond to an advertisement. The distribution of features across training and production data are not consistent
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/split-data

QUESTION 4
You need to implement a new cost factor scenario for the ad response models as illustrated in the performance curve exhibit.
Which technique should you use?

A. Set the threshold to 0.5 and retrain if weighted Kappa deviates +/- 5% from 0.45.
B. Set the threshold to 0.05 and retrain if weighted Kappa deviates +/- 5% from 0.5.
C. Set the threshold to 0.2 and retrain if weighted Kappa deviates +/- 5% from 0.6.
D. Set the threshold to 0.75 and retrain if weighted Kappa deviates +/- 5% from 0.15.

Correct Answer: A
Section:
Explanation:
Scenario:
Performance curves of current and proposed cost factor scenarios are shown in the following diagram:

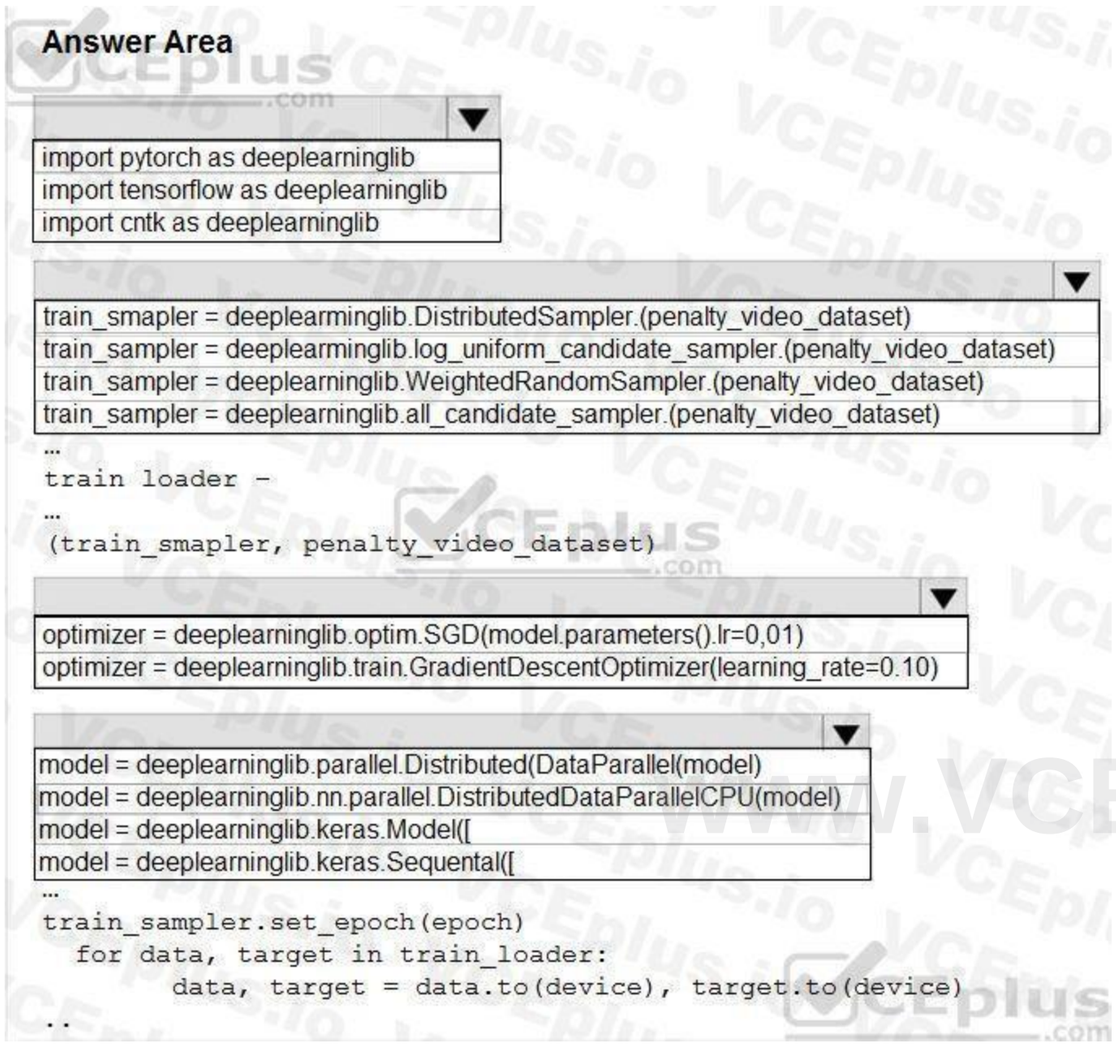


The ad propensity model uses a cut threshold is 0.45 and retrains occur if weighted Kappa deviated from 0.1 +/- 5%.

QUESTION 5
HOTSPOT
You need to use the Python language to build a sampling strategy for the global penalty detection models.
How should you complete the code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

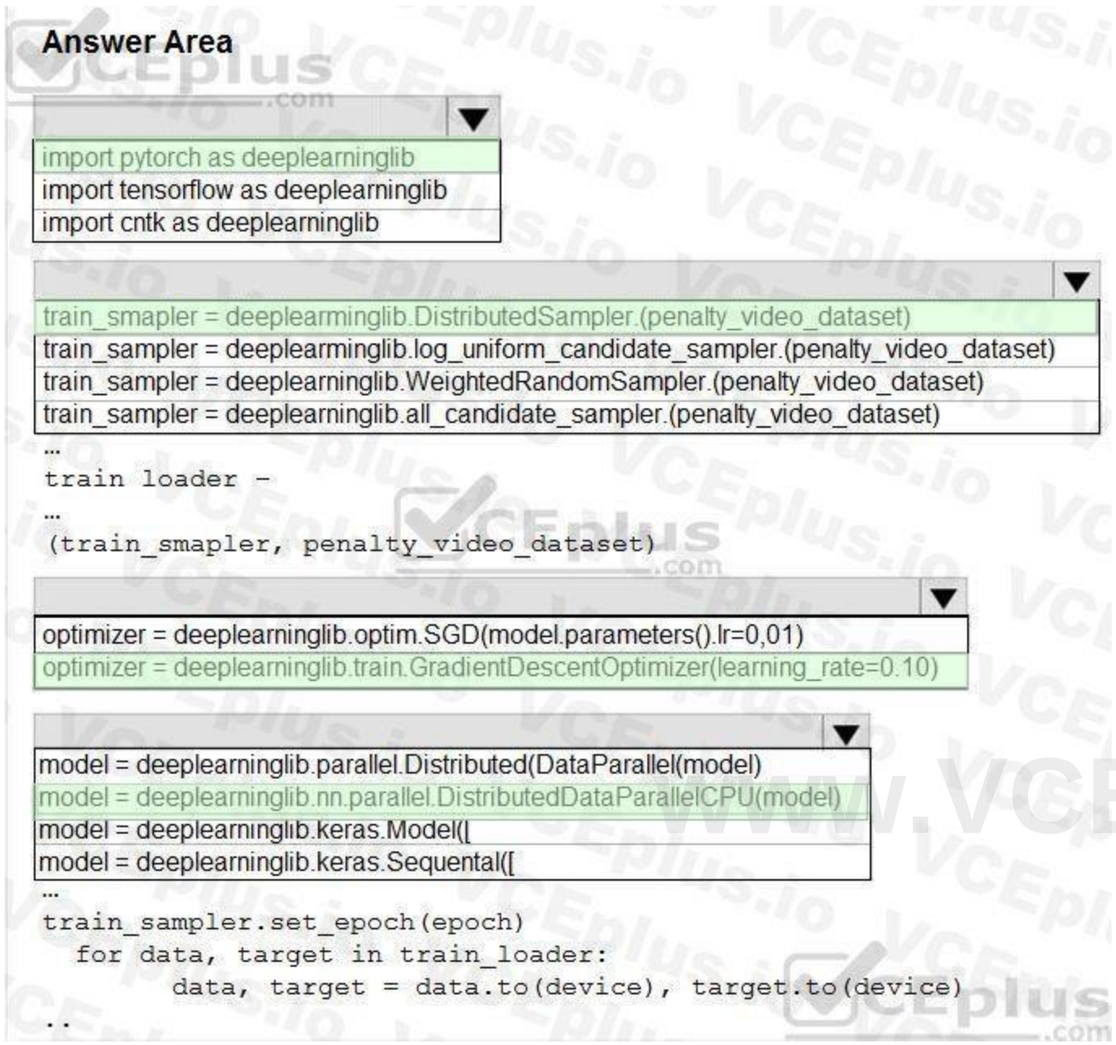
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:

Explanation:

Box 1: import pytorch as deeplearninglib

Box 2: ..DistributedSampler(Sampler)..

DistributedSampler(Sampler):

Sampler that restricts data loading to a subset of the dataset.

It is especially useful in conjunction with class:`torch.nn.parallel.DistributedDataParallel`. In such case, each process can pass a DistributedSampler instance as a DataLoader sampler, and load a subset of the original dataset that is exclusive to it.

Scenario: Sampling must guarantee mutual and collective exclusively between local and global segmentation models that share the same features.

Box 3: optimizer = deeplearninglib.train. GradientDescentOptimizer(learning_rate=0.10)

Incorrect Answers: ..SGD..

Scenario: All penalty detection models show inference phases using a Stochastic Gradient Descent (SGD) are running too slow.

Box 4: .. nn.parallel.DistributedDataParallel..

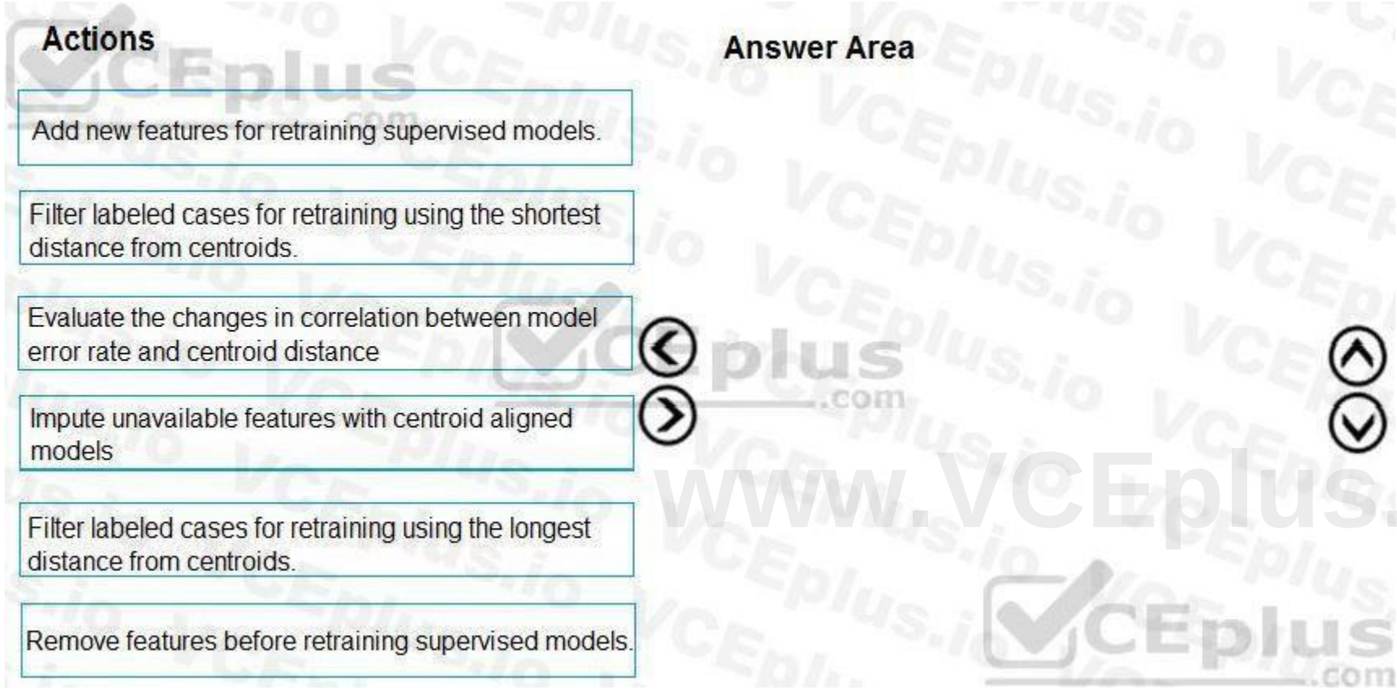
DistributedSampler(Sampler): The sampler that restricts data loading to a subset of the dataset.

It is especially useful in conjunction with :class:`torch.nn.parallel.DistributedDataParallel`.

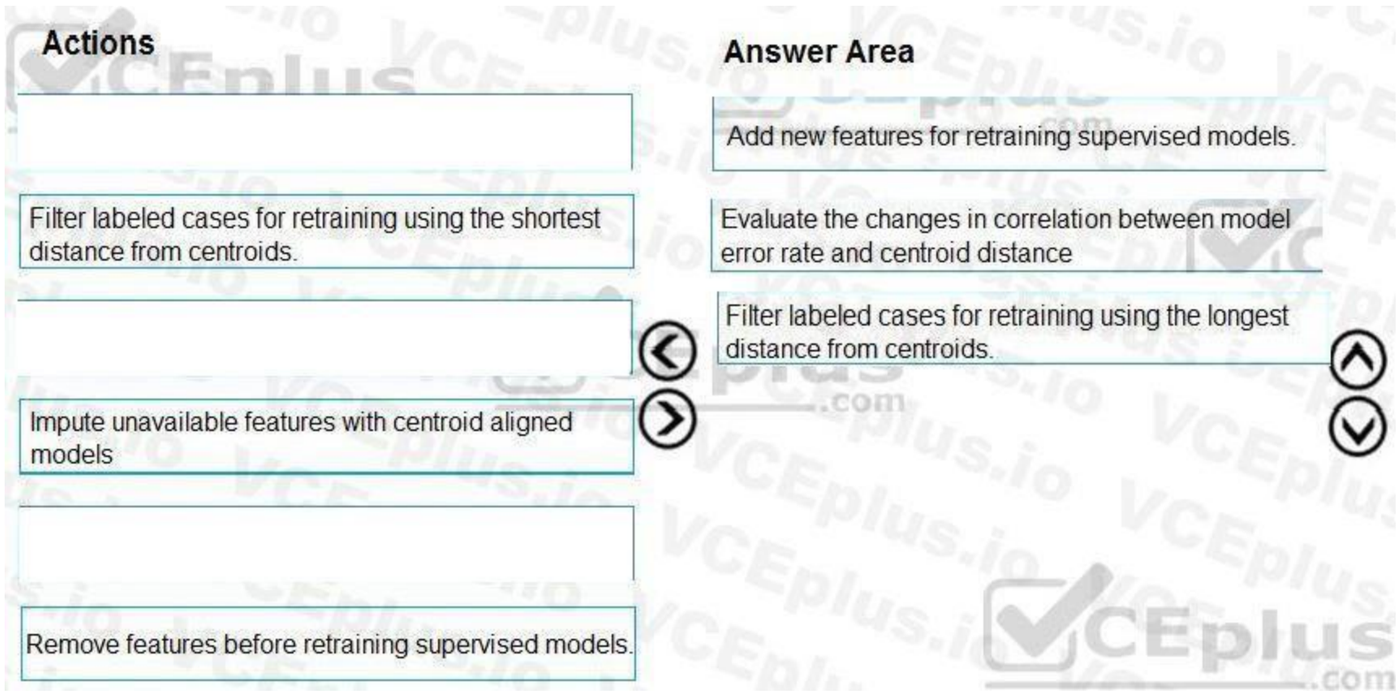
References:
https://github.com/pytorch/pytorch/blob/master/torch/utils/data/distributed.py

QUESTION 6
DRAG DROP
You need to define an evaluation strategy for the crowd sentiment models.
Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



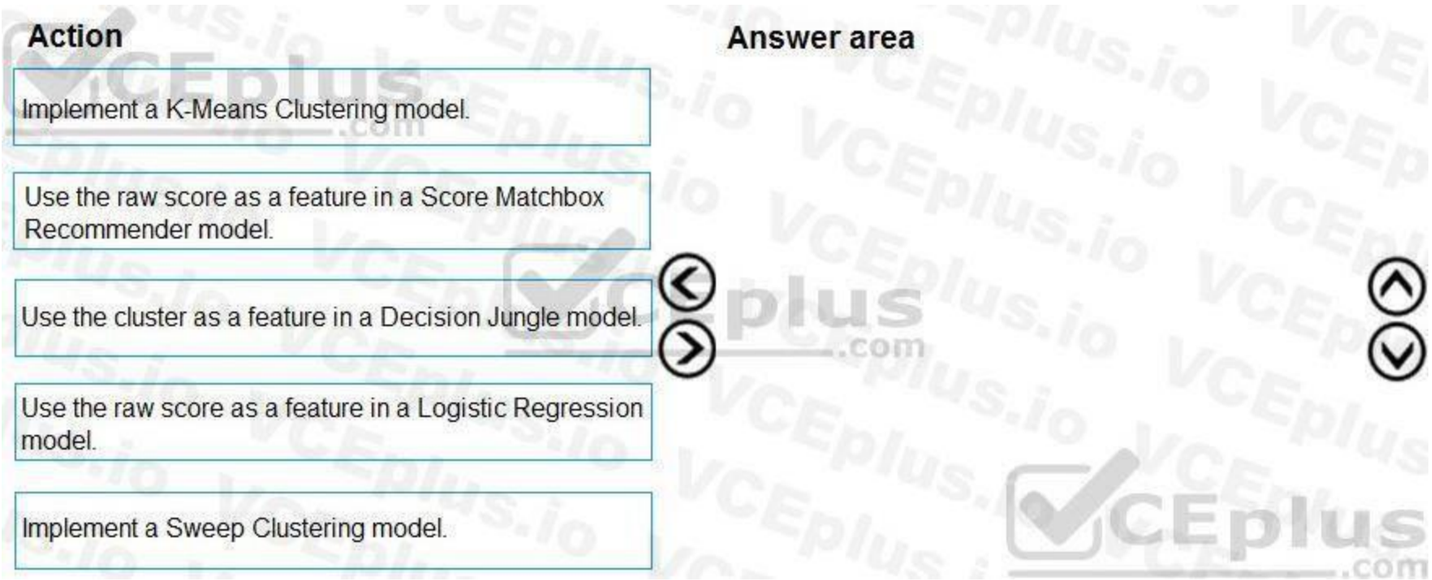
Correct Answer:



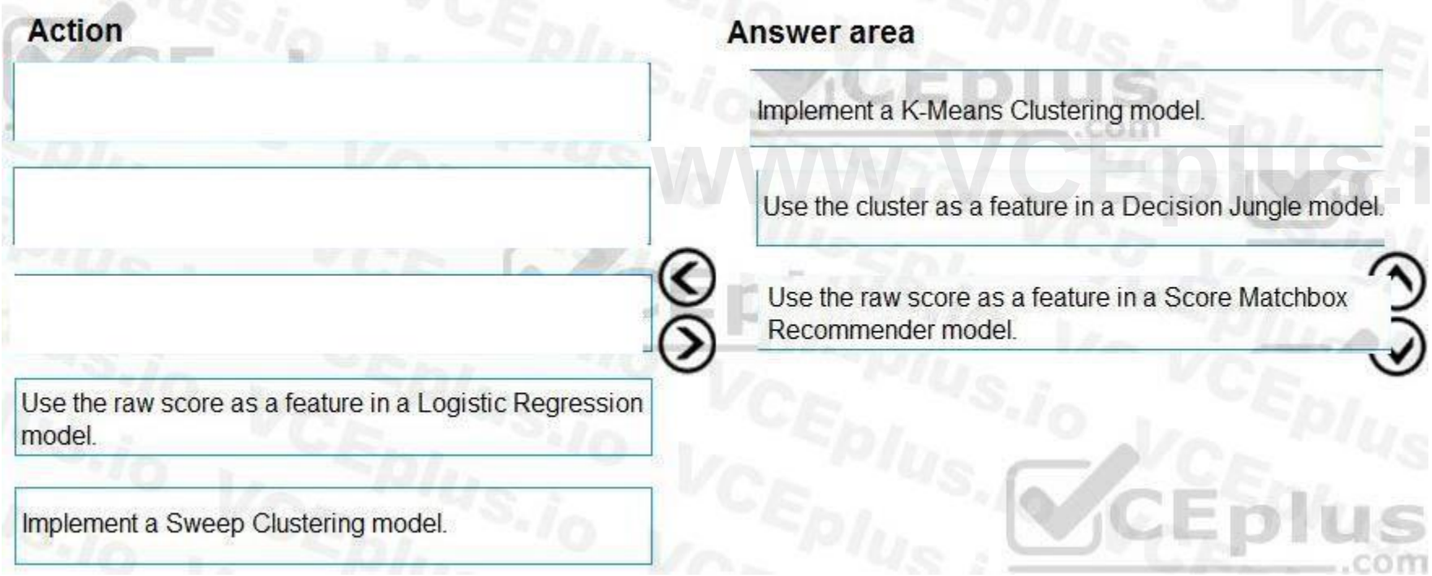
Section:
Explanation:
Scenario:
Experiments for local crowd sentiment models must combine local penalty detection data.
Crowd sentiment models must identify known sounds such as cheers and known catch phrases. Individual crowd sentiment models will detect similar sounds.
Note: Evaluate the changed in correlation between model error rate and centroid distance
In machine learning, a nearest centroid classifier or nearest prototype classifier is a classification model that assigns to observations the label of the class of training samples whose mean (centroid) is closest to the observation.
References:
https://en.wikipedia.org/wiki/Nearest_centroid_classifier
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/sweep-clustering

QUESTION 7
DRAG DROP
You need to define a modeling strategy for ad response.
Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:

Explanation:

Step 1: Implement a K-Means Clustering model

Step 2: Use the cluster as a feature in a Decision jungle model.

Decision jungles are non-parametric models, which can represent non-linear decision boundaries.

Step 3: Use the raw score as a feature in a Score Matchbox Recommender model

The goal of creating a recommendation system is to recommend one or more "items" to "users" of the system. Examples of an item could be a movie, restaurant, book, or song. A user could be a person, group of persons, or other entity with item preferences.

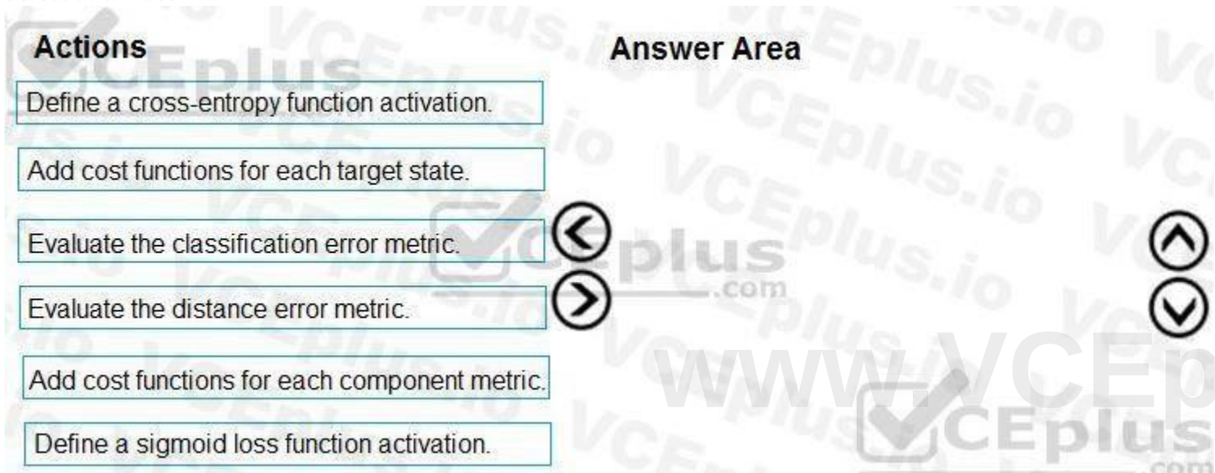
Scenario:

Ad response rated declined.

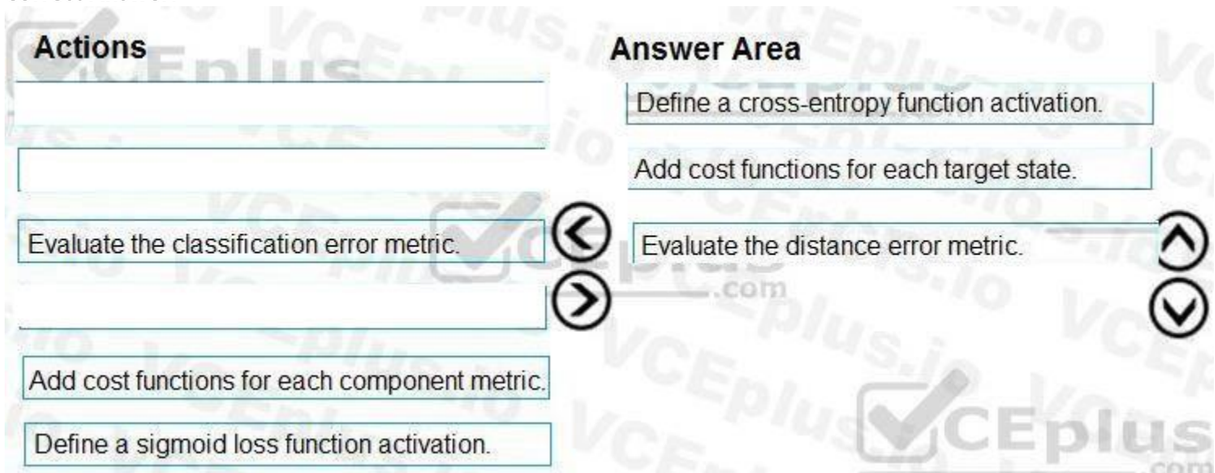
Ad response models must be trained at the beginning of each event and applied during the sporting event.
Market segmentation models must optimize for similar ad response history.
Ad response models must support non-linear boundaries of features.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/multiclass-decision-jungle
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/score-matchbox-recommender

QUESTION 8
DRAG DROP
You need to define an evaluation strategy for the crowd sentiment models.
Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:
Explanation:
Step 1: Define a cross-entropy function activation

When using a neural network to perform classification and prediction, it is usually better to use cross-entropy error than classification error, and somewhat better to use cross-entropy error than mean squared error to evaluate the quality of the neural network.
Step 2: Add cost functions for each target state.
Step 3: Evaluated the distance error metric.
References:
https://www.analyticsvidhya.com/blog/2018/04/fundamentals-deep-learning-regularization-techniques/

03 - Run experiments and train models
Case study
This is a case study. Case studies are not timed separately. You can use as much exam time as you would like to complete each case. However, there may be additional case studies and sections on this exam. You must manage your time to ensure that you are able to complete all questions included on this exam in the time provided.
To answer the questions included in a case study, you will need to reference information that is provided in the case study. Case studies might contain exhibits and other resources that provide more information about the scenario that is described in the case study. Each question is independent of the other questions in this case study.
At the end of this case study, a review screen will appear. This screen allows you to review your answers and to make changes before you move to the next section of the exam. After you begin a new section, you cannot return to this section.
To start the case study To display the first question in this case study, click the Next button. Use the buttons in the left pane to explore the content of the case study before you answer the questions. Clicking these buttons displays information such as business requirements, existing environment, and problem statements. If the case study has an All Information tab, note that the information displayed is identical to the information displayed on the subsequent tabs. When you are ready to answer a question, click the Question button to return to the question.
Overview
You are a data scientist for Fabrikam Residences, a company specializing in quality private and commercial property in the United States. Fabrikam Residences is considering expanding into Europe and has asked you to investigate prices for private residences in major European cities.
You use Azure Machine Learning Studio to measure the median value of properties. You produce a regression model to predict property prices by using the Linear Regression and Bayesian Linear Regression modules.
Datasets
There are two datasets in CSV format that contain property details for two cities, London and Paris. You add both files to Azure Machine Learning Studio as separate datasets to the starting point for an experiment.
Both datasets contain the following columns:

Column heading	Description
CapitaCrimeRate	per capita crime rate by town
Zoned	proportion of residential land zoned for lots over 25.000 square feet
NonRetailAcres	proportion of retail business acres per town
NextToRiver	proximity of a property to the river
NitrogenOxideConcentration	nitric oxides concentration (parts per 10 million)
AvgRoomsPerHouse	average number of rooms per dwelling
Age	proportion of owner-occupied units built prior to 1940
DistanceToEmploymentCenter	weighted distances to employment centers
AccessibilityToHighway	index of accessibility to radial highways to a value of two decimal places
Tax	full value property tax rate per $10,000
PupilTeacherRatio	pupil to teacher ratio by town
ProfessionalClass	professional class percentage
LowerStatus	percentage lower status of the population
MedianValue	median value of owner-occupied homes in $1000s

An initial investigation shows that the datasets are identical in structure apart from the MedianValue column. The smaller Paris dataset contains the MedianValue in text format, whereas the larger London dataset contains the MedianValue in numerical format.
Data issues
Missing values
The AccessibilityToHighway column in both datasets contains missing values. The missing data must be replaced with new data so that it is modeled conditionally using the other variables in the data before filling in the missing values.
Columns in each dataset contain missing and null values. The datasets also contain many outliers. The Age column has a high proportion of outliers. You need to remove the rows that have outliers in the Age column. The

MedianValue and AvgRoomsInHouse columns both hold data in numeric format. You need to select a feature selection algorithm to analyze the relationship between the two columns in more detail.
Model fit
The model shows signs of overfitting. You need to produce a more refined regression model that reduces the overfitting.
Experiment requirements
You must set up the experiment to cross-validate the Linear Regression and Bayesian Linear Regression modules to evaluate performance. In each case, the predictor of the dataset is the column named MedianValue. You must ensure that the datatype of the MedianValue column of the Paris dataset matches the structure of the London dataset.
You must prioritize the columns of data for predicting the outcome. You must use non-parametric statistics to measure relationships.
You must use a feature selection algorithm to analyze the relationship between the MedianValue and AvgRoomsInHouse columns.
Model training
Permutation Feature Importance
Given a trained model and a test dataset, you must compute the Permutation Feature Importance scores of feature variables. You must be determined the absolute fit for the model.
Hyperparameters
You must configure hyperparameters in the model learning process to speed the learning phase. In addition, this configuration should cancel the lowest performing runs at each evaluation interval, thereby directing effort and resources towards models that are more likely to be successful.
You are concerned that the model might not efficiently use compute resources in hyperparameter tuning. You also are concerned that the model might prevent an increase in the overall tuning time. Therefore, must implement an early stopping criterion on models that provides savings without terminating promising jobs.
Testing
You must produce multiple partitions of a dataset based on sampling using the Partition and Sample module in Azure Machine Learning Studio.
Cross-validation
You must create three equal partitions for cross-validation. You must also configure the cross-validation process so that the rows in the test and training datasets are divided evenly by properties that are near each city's main river. You must complete this task before the data goes through the sampling process.
Linear regression module
When you train a Linear Regression module, you must determine the best features to use in a model. You can choose standard metrics provided to measure performance before and after the feature importance process completes. The distribution of features across multiple training models must be consistent.
Data visualization
You need to provide the test results to the Fabrikam Residences team. You create data visualizations to aid in presenting the results.
You must produce a Receiver Operating Characteristic (ROC) curve to conduct a diagnostic test evaluation of the model. You need to select appropriate methods for producing the ROC curve in Azure Machine Learning Studio to compare the Two-Class Decision Forest and the Two-Class Decision Jungle modules with one another.

QUESTION 1
You need to visually identify whether outliers exist in the Age column and quantify the outliers before the outliers are removed.
Which three Azure Machine Learning Studio modules should you use? Each correct answer presents part of the solution.
NOTE: Each correct selection is worth one point.

A. Create Scatterplot
B. Summarize Data
C. Clip Values
D. Replace Discrete Values
E. Build Counting Transform

Correct Answer: A, B, C
Section:
Explanation:
B: To have a global view, the summarize data module can be used. Add the module and connect it to the data set that needs to be visualized. A: One way to quickly identify Outliers visually is to create scatter plots.
C: The easiest way to treat the outliers in Azure ML is to use the Clip Values module. It can identify and optionally replace data values that are above or below a specified threshold.
You can use the Clip Values module in Azure Machine Learning Studio, to identify and optionally replace data values that are above or below a specified threshold. This is useful when you want to remove outliers or replace them with a mean, a constant, or other substitute value.
Reference:
https://blogs.msdn.microsoft.com/azuredev/2017/05/27/data-cleansing-tools-in-azure-machine-learning/ https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clip-values

QUESTION 2
You need to select a feature extraction method.
Which method should you use?

A. Mutual information
B. Pearson's correlation
C. Spearman correlation
D. Fisher Linear Discriminant Analysis

Correct Answer: C
Section:
Explanation:
Spearman's rank correlation coefficient assesses how well the relationship between two variables can be described using a monotonic function.
Note: Both Spearman's and Kendall's can be formulated as special cases of a more general correlation coefficient, and they are both appropriate in this scenario.
Scenario: The MedianValue and AvgRoomsInHouse columns both hold data in numeric format. You need to select a feature selection algorithm to analyze the relationship between the two columns in more detail.
Incorrect Answers:
B: The Spearman correlation between two variables is equal to the Pearson correlation between the rank values of those two variables; while Pearson's correlation assesses linear relationships, Spearman's correlation assesses monotonic relationships (whether linear or not).
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/feature-selection-modules

QUESTION 3
You need to select a feature extraction method.
Which method should you use?

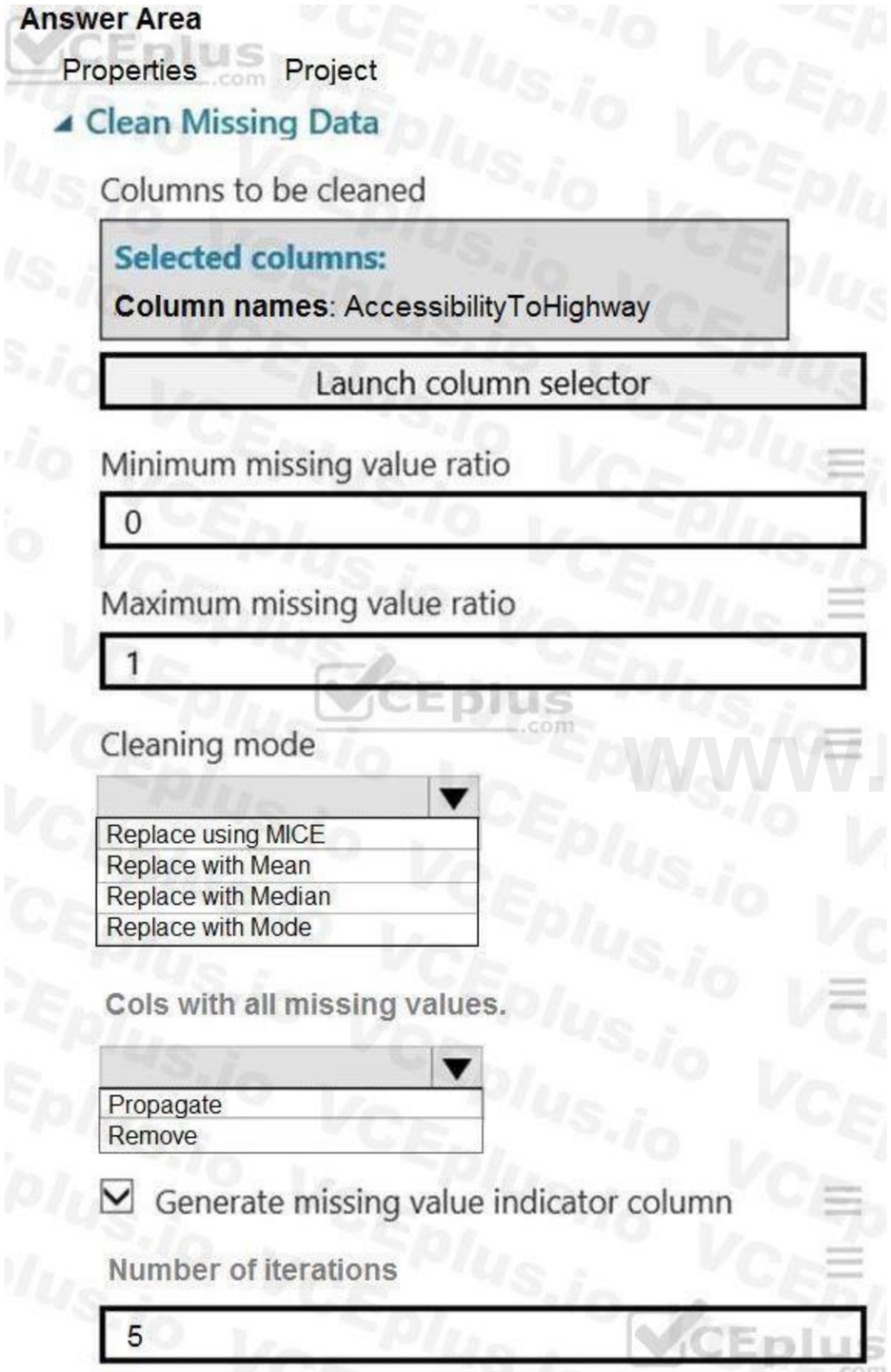
A. Mutual information
B. Mood's median test
C. Kendall correlation
D. Permutation Feature Importance

Correct Answer: C
Section:
Explanation:
In statistics, the Kendall rank correlation coefficient, commonly referred to as Kendall's tau coefficient (after the Greek letter Ď„), is a statistic used to measure the ordinal association between two measured quantities. It is a supported method of the Azure Machine Learning Feature selection.
Note: Both Spearman's and Kendall's can be formulated as special cases of a more general correlation coefficient, and they are both appropriate in this scenario.
Scenario: The MedianValue and AvgRoomsInHouse columns both hold data in numeric format. You need to select a feature selection algorithm to analyze the relationship between the two columns in more detail.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/feature-selection-modules

QUESTION 4
HOTSPOT
You need to replace the missing data in the AccessibilityToHighway columns.
How should you configure the Clean Missing Data module? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

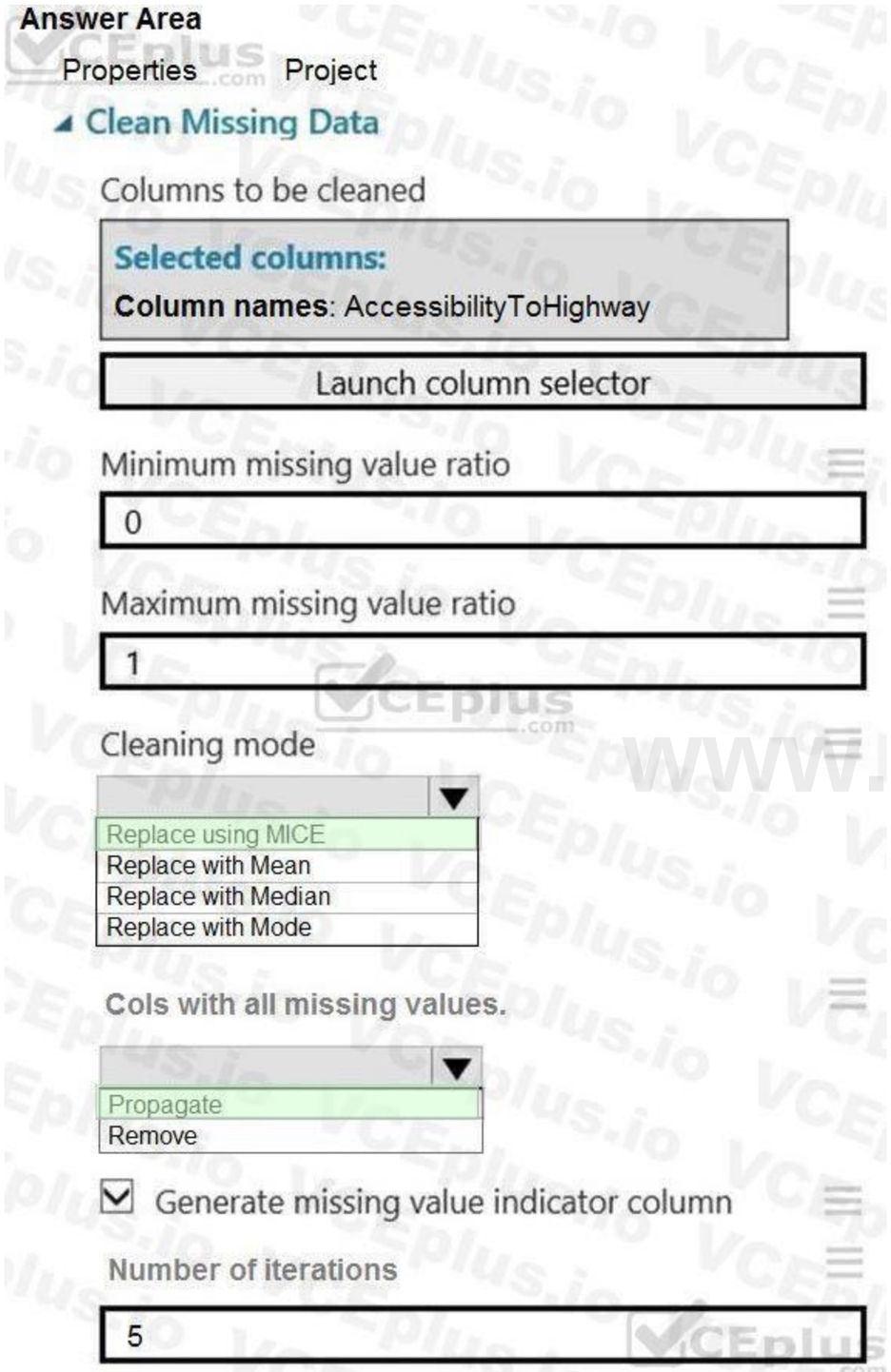
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:

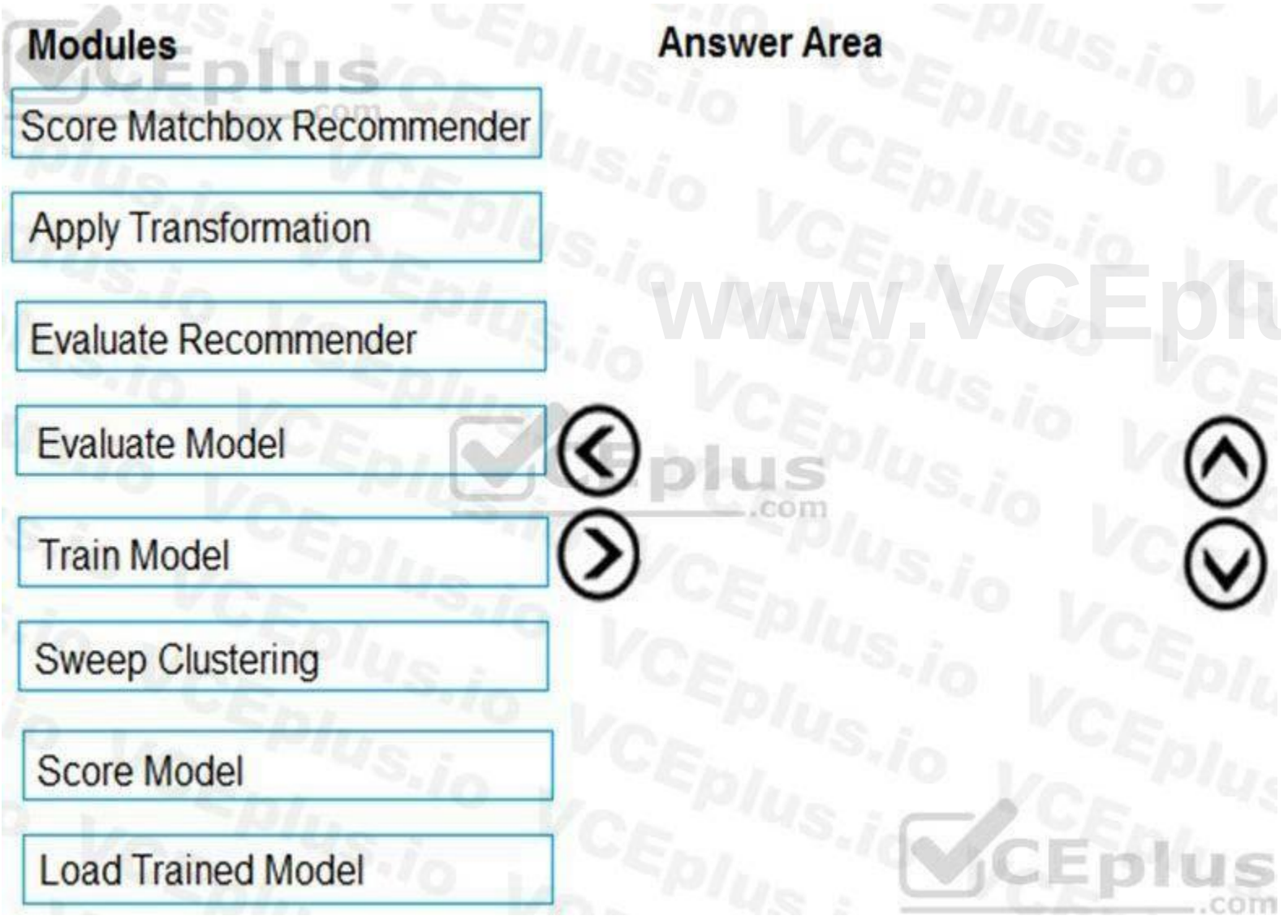
Explanation:

Box 1: Replace using MICE Replace using MICE: For each missing value, this option assigns a new value, which is calculated by using a method described in the statistical literature as "Multivariate Imputation using

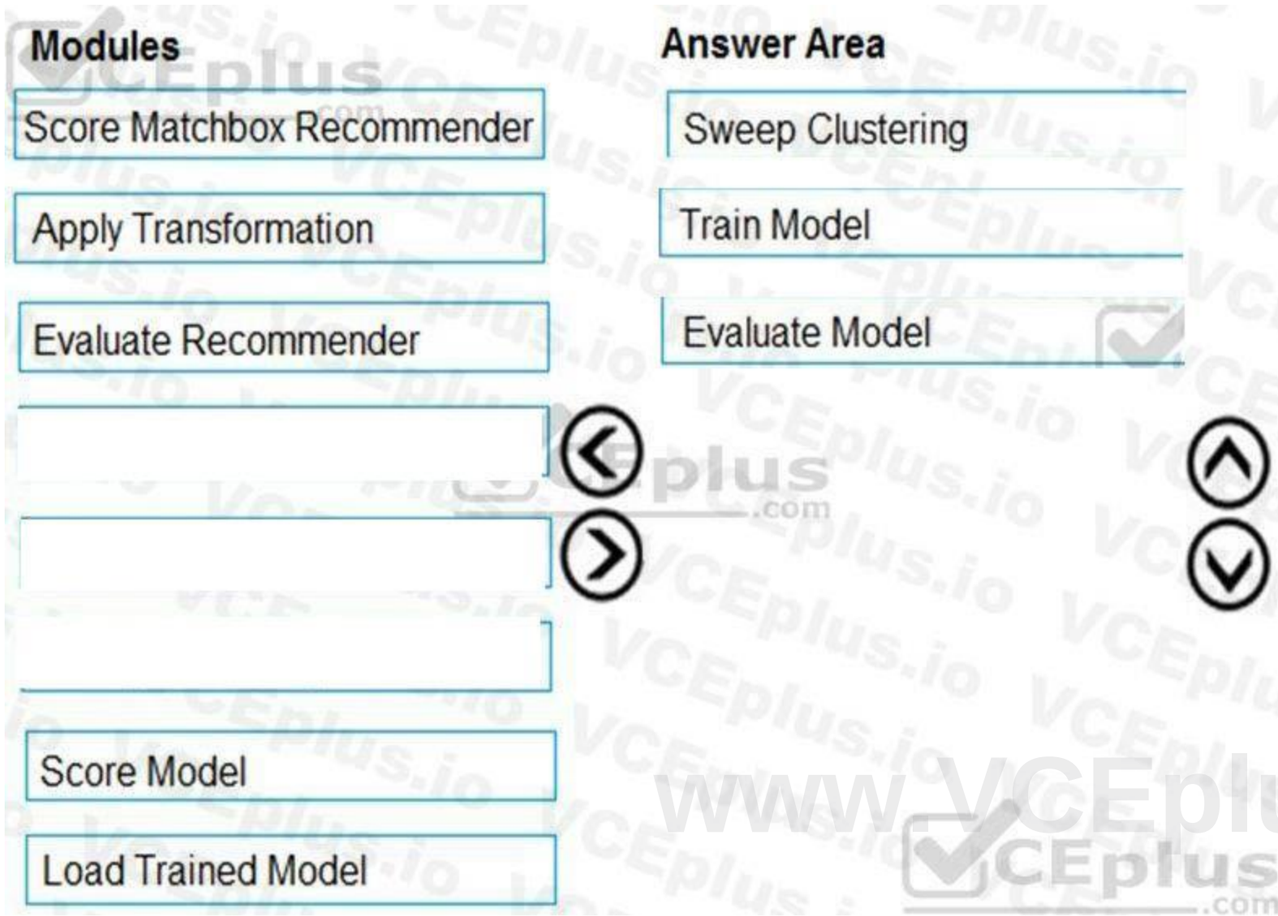
Chained Equations" or "Multiple Imputation by Chained Equations". With a multiple imputation method, each variable with missing data is modeled conditionally using the other variables in the data before filling in the missing values.
Scenario: The AccessibilityToHighway column in both datasets contains missing values. The missing data must be replaced with new data so that it is modeled conditionally using the other variables in the data before filling in the missing values.
Box 2: Propagate
Cols with all missing values indicate if columns of all missing values should be preserved in the output.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/clean-missing-data

QUESTION 5
DRAG DROP
You need to produce a visualization for the diagnostic test evaluation according to the data visualization requirements.
Which three modules should you recommend be used in sequence? To answer, move the appropriate modules from the list of modules to the answer area and arrange them in the correct order.

Select and Place:



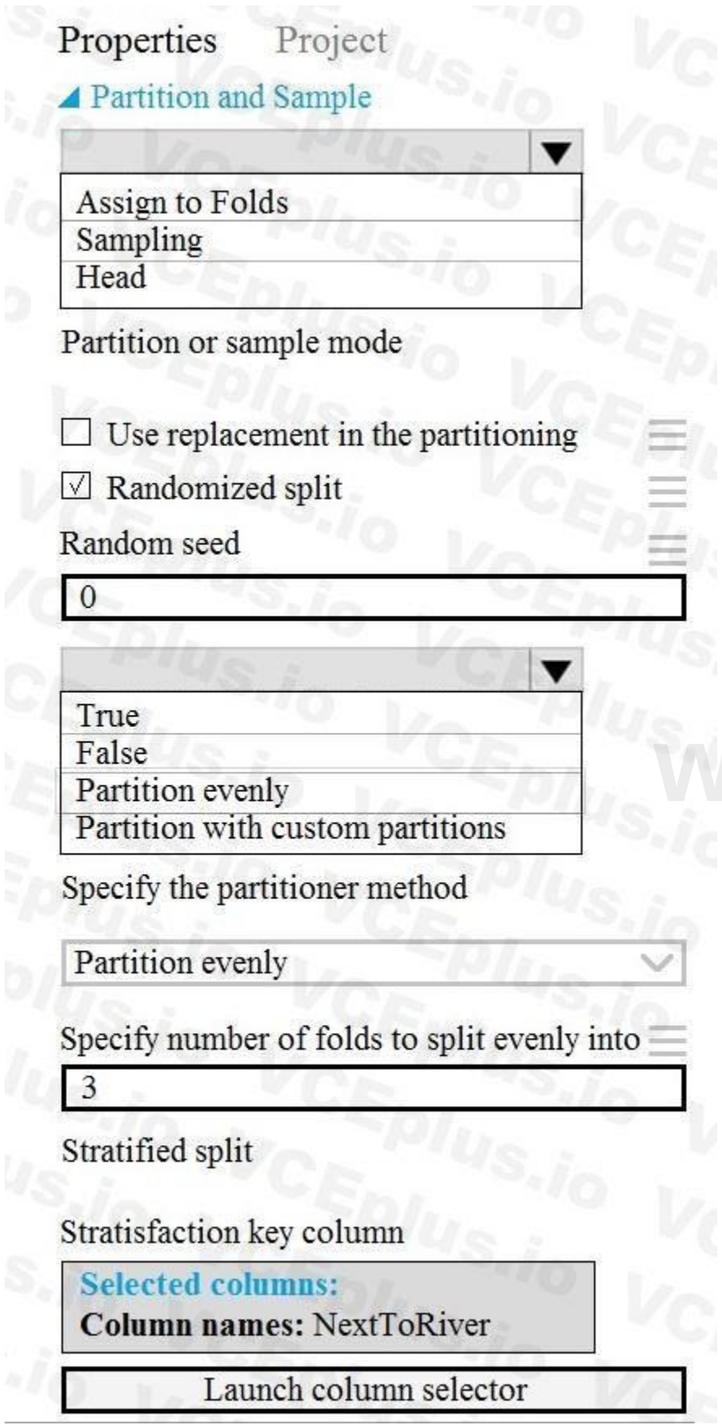
Correct Answer:



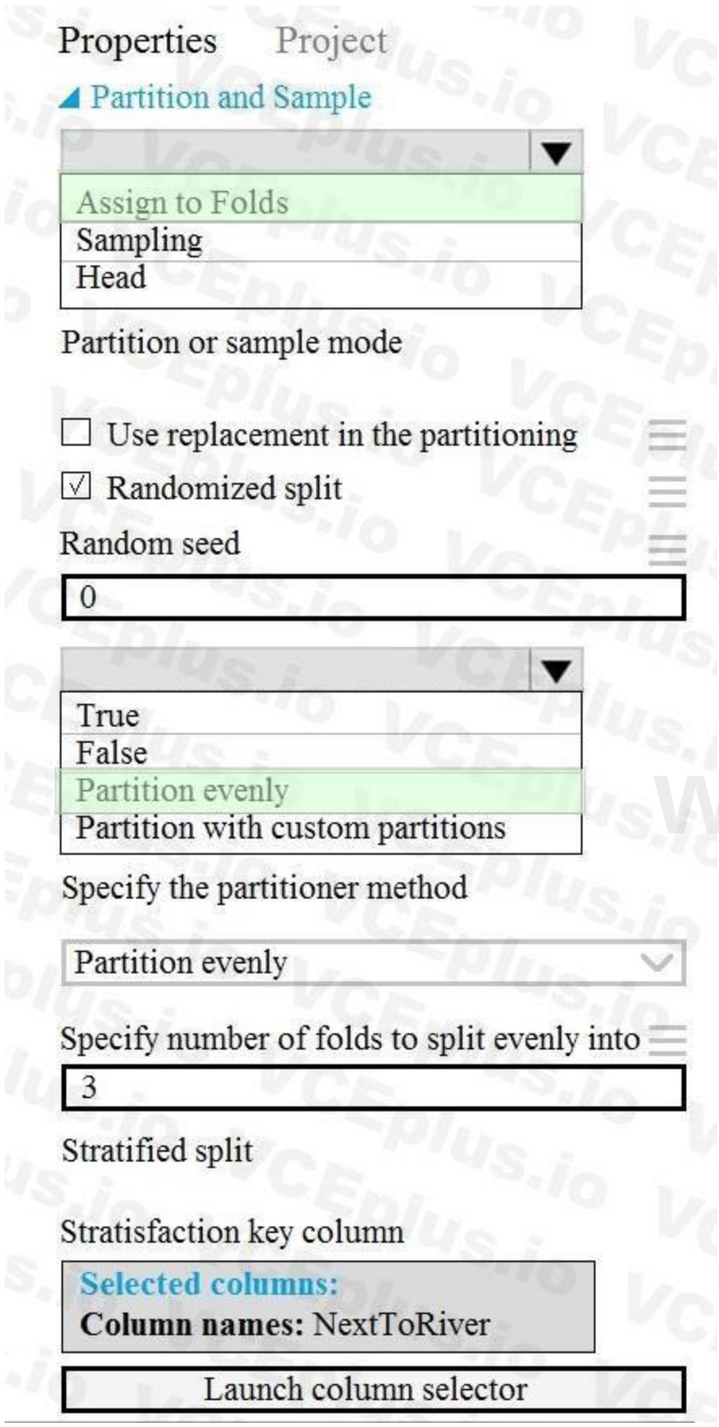
Section:
Explanation:
Step 1: Sweep Clustering
Start by using the "Tune Model Hyperparameters" module to select the best sets of parameters for each of the models we're considering.
One of the interesting things about the "Tune Model Hyperparameters" module is that it not only outputs the results from the Tuning, it also outputs the Trained Model.
Step 2: Train Model
Step 3: Evaluate Model
Scenario: You need to provide the test results to the Fabrikam Residences team. You create data visualizations to aid in presenting the results.
You must produce a Receiver Operating Characteristic (ROC) curve to conduct a diagnostic test evaluation of the model. You need to select appropriate methods for producing the ROC curve in Azure Machine Learning Studio to compare the Two-Class Decision Forest and the Two-Class Decision Jungle modules with one another.
References:
http://breaking-bi.blogspot.com/2017/01/azure-machine-learning-model-evaluation.html

QUESTION 6
HOTSPOT
You need to identify the methods for dividing the data according to the testing requirements.
Which properties should you select? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:



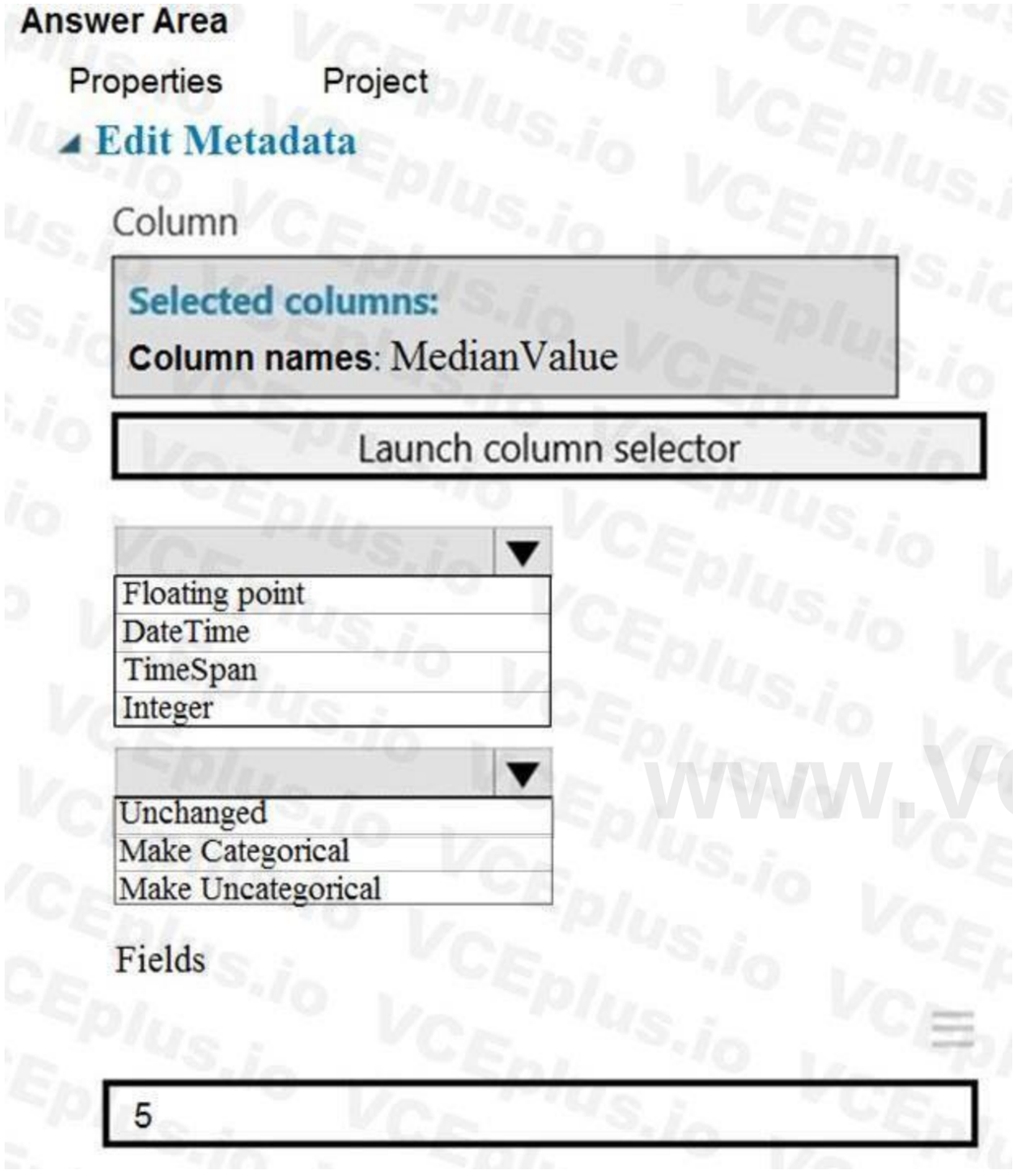
Section:
Explanation:
Scenario: Testing

You must produce multiple partitions of a dataset based on sampling using the Partition and Sample module in Azure Machine Learning Studio.
Box 1: Assign to folds
Use Assign to folds option when you want to divide the dataset into subsets of the data. This option is also useful when you want to create a custom number of folds for cross-validation, or to split rows into several groups.
Not Head: Use Head mode to get only the first n rows. This option is useful if you want to test a pipeline on a small number of rows, and don't need the data to be balanced or sampled in any way.
Not Sampling: The Sampling option supports simple random sampling or stratified random sampling. This is useful if you want to create a smaller representative sample dataset for testing.
Box 2: Partition evenly
Specify the partitioner method: Indicate how you want data to be apportioned to each partition, using these options:
Partition evenly: Use this option to place an equal number of rows in each partition. To specify the number of output partitions, type a whole number in the Specify number of folds to split evenly into text box.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/partition-and-sample

QUESTION 7
HOTSPOT
You need to configure the Edit Metadata module so that the structure of the datasets match.
Which configuration options should you select? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

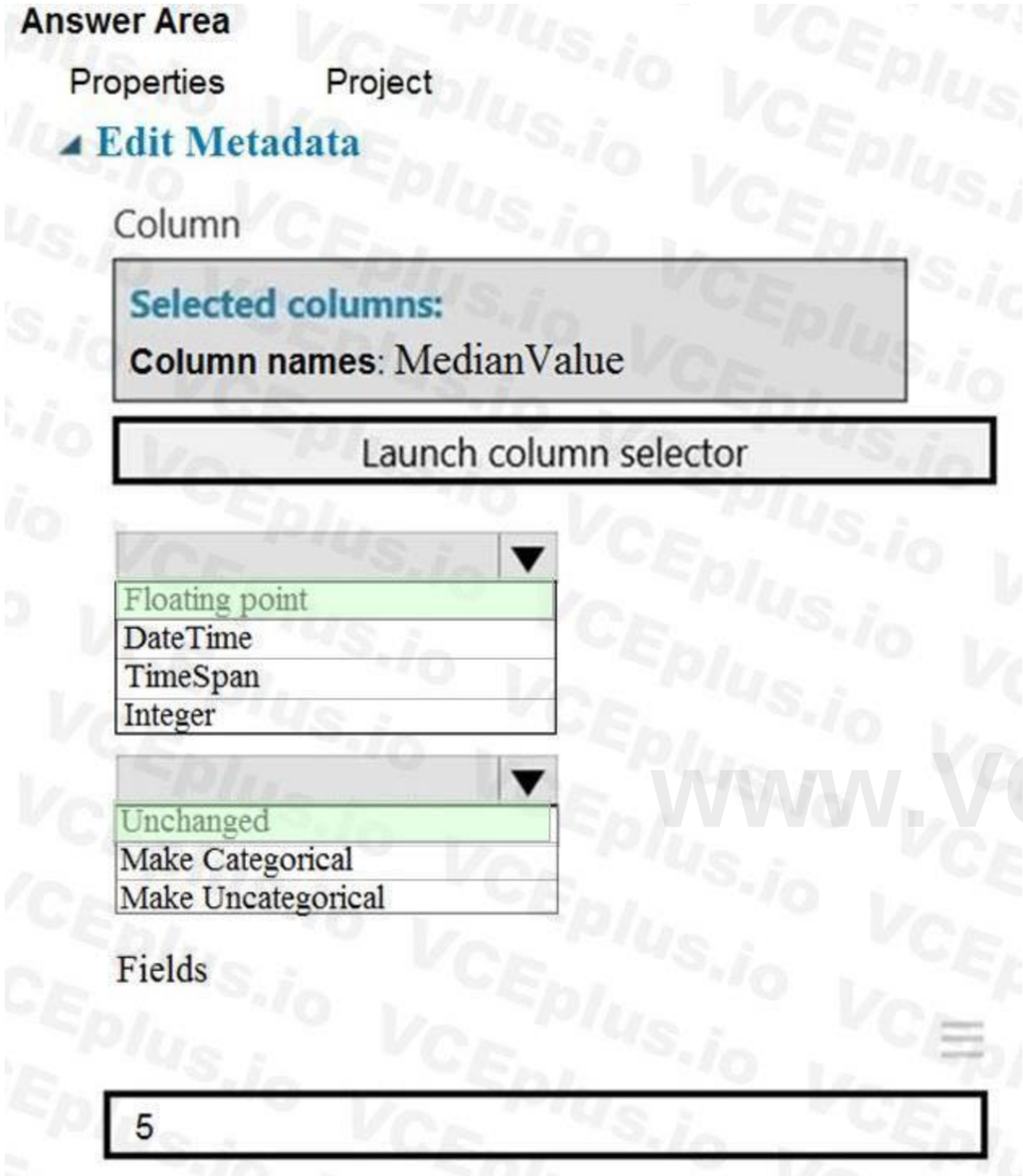
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:

Explanation:

Box 1: Floating point

Need floating point for Median values.

Scenario: An initial investigation shows that the datasets are identical in structure apart from the MedianValue column. The smaller Paris dataset contains the MedianValue in text format, whereas the larger London dataset contains the

MedianValue in numerical format.

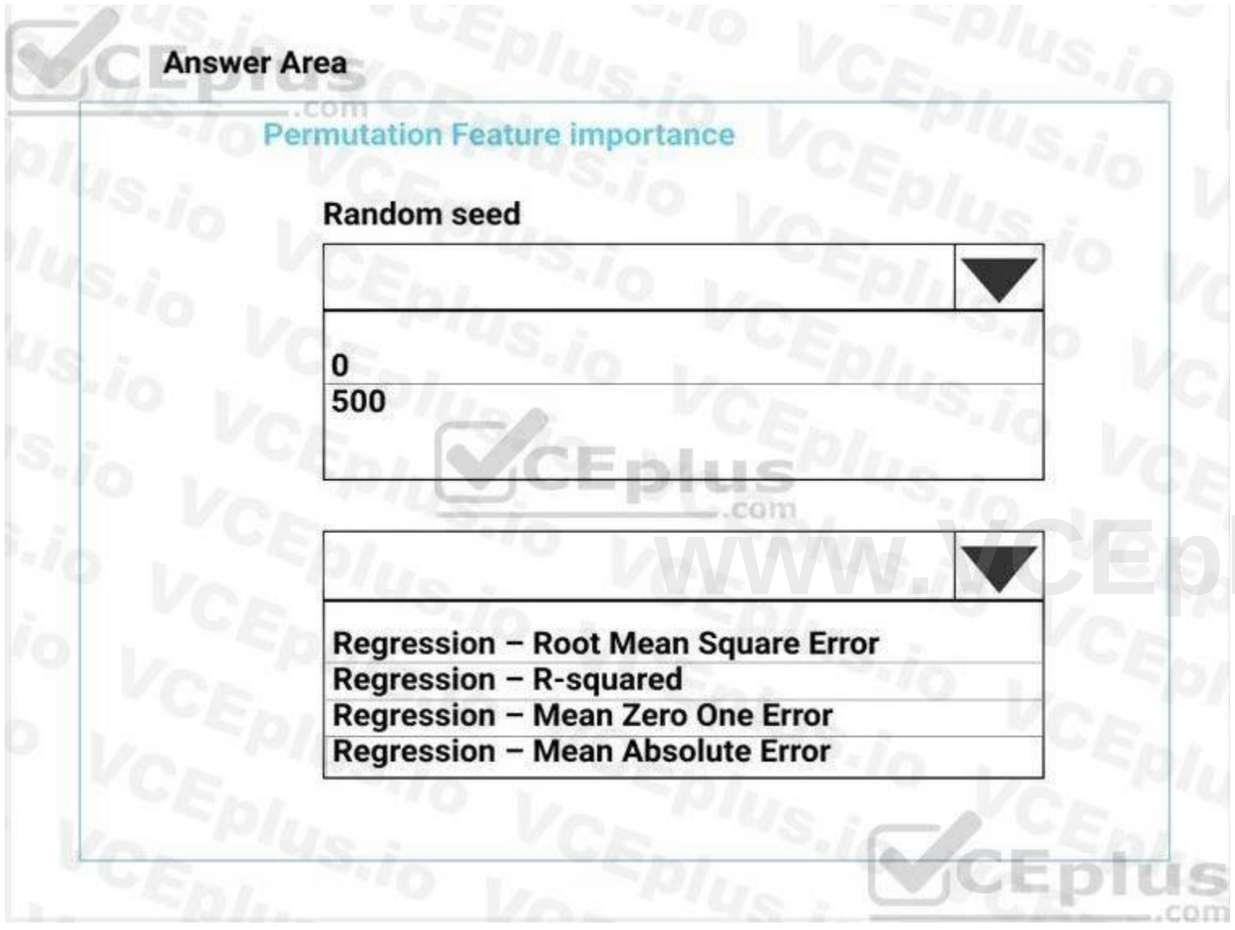
Box 2: Unchanged

Note: Select the Categorical option to specify that the values in the selected columns should be treated as categories.

For example, you might have a column that contains the numbers 0,1 and 2, but know that the numbers actually mean "Smoker", "Non smoker" and "Unknown". In that case, by flagging the column as categorical you can ensure that the values are not used in numeric calculations, only to group data.

QUESTION 8
HOTSPOT
You need to configure the Permutation Feature Importance module for the model training requirements.
What should you do? To answer, select the appropriate options in the dialog box in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

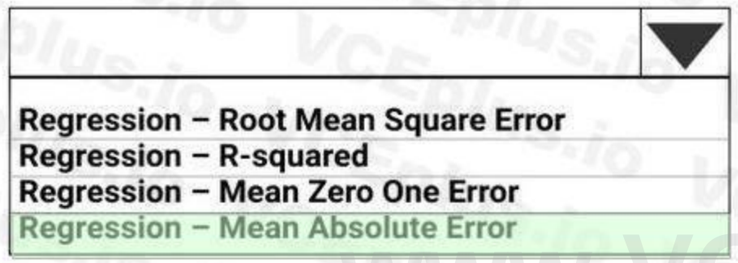


Answer Area:

Answer Area

Permutation Feature importance

Random seed



Section:

Explanation:

Box 1: 500

For Random seed, type a value to use as seed for randomization. If you specify 0 (the default), a number is generated based on the system clock.

A seed value is optional, but you should provide a value if you want reproducibility across runs of the same experiment.

Here we must replicate the findings.

Box 2: Mean Absolute Error

Scenario: Given a trained model and a test dataset, you must compute the Permutation Feature Importance scores of feature variables. You need to set up the Permutation Feature Importance module to select the correct metric to investigate the model's accuracy and replicate the findings.

Regression. Choose one of the following: Precision, Recall, Mean Absolute Error , Root Mean Squared Error, Relative Absolute Error, Relative Squared Error, Coefficient of Determination

References:

https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/permutation-feature-importance

QUESTION 9

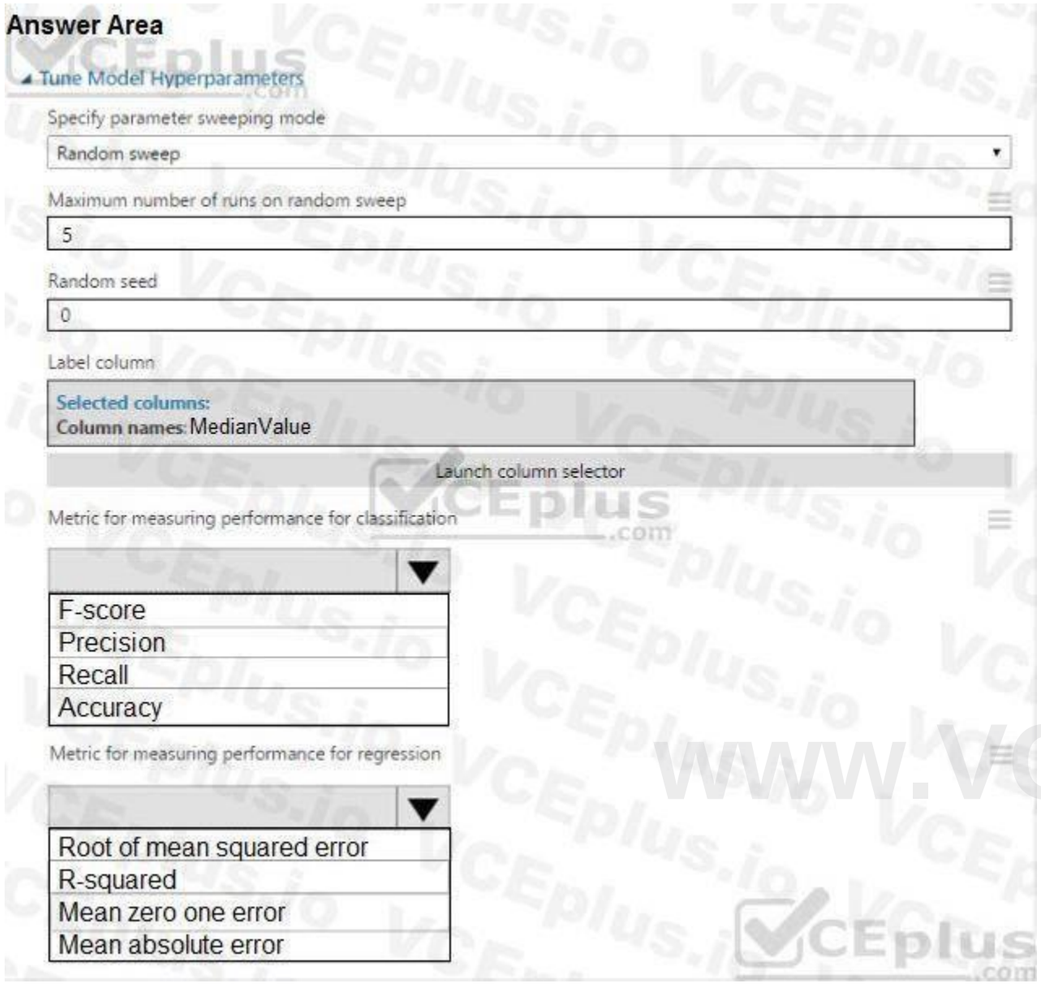
HOTSPOT

You need to set up the Permutation Feature Importance module according to the model training requirements.

Which properties should you select? To answer, select the appropriate options in the answer area.

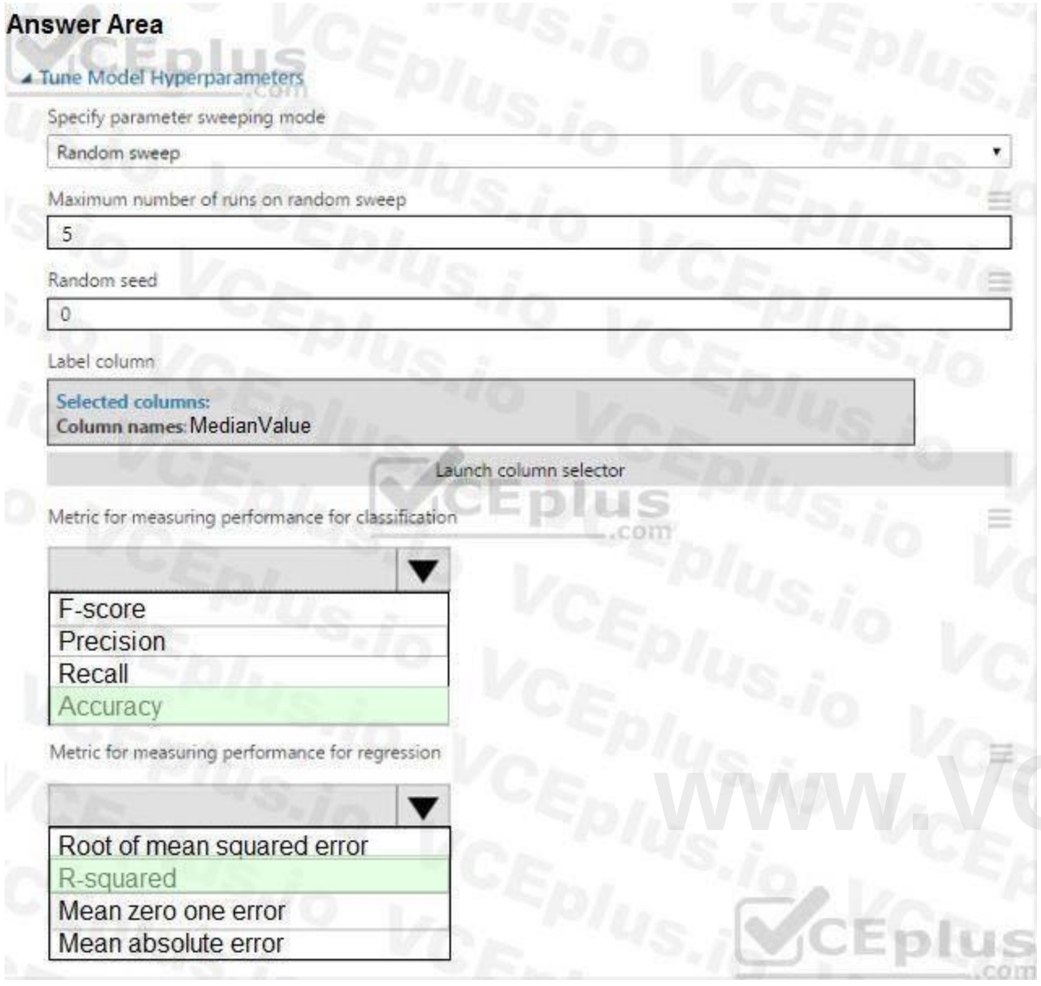
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

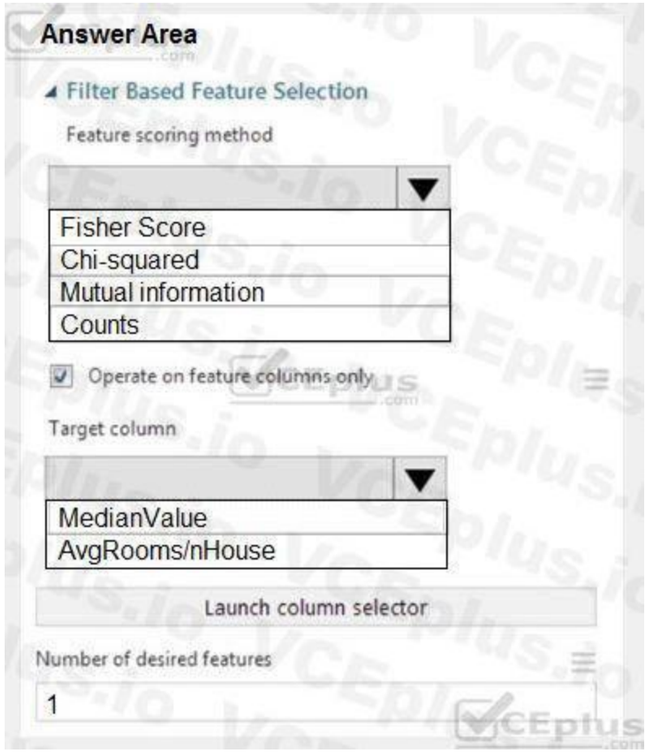
Answer Area



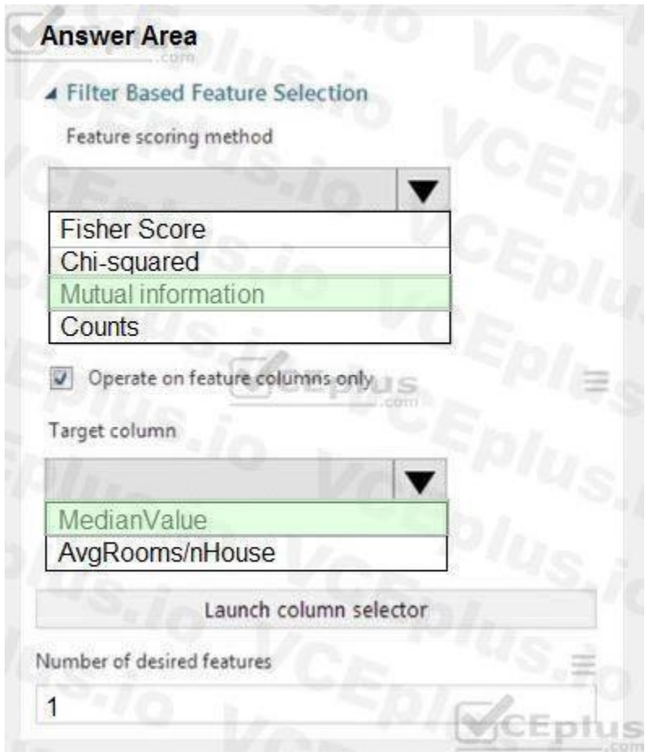
Section:
Explanation:
Box 1: Accuracy
Scenario: You want to configure hyperparameters in the model learning process to speed the learning phase by using hyperparameters. In addition, this configuration should cancel the lowest performing runs at each evaluation interval, thereby directing effort and resources towards models that are more likely to be successful.
Box 2: R-Squared

QUESTION 10
HOTSPOT
You need to configure the Feature Based Feature Selection module based on the experiment requirements and datasets.
How should you configure the module properties? To answer, select the appropriate options in the dialog box in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

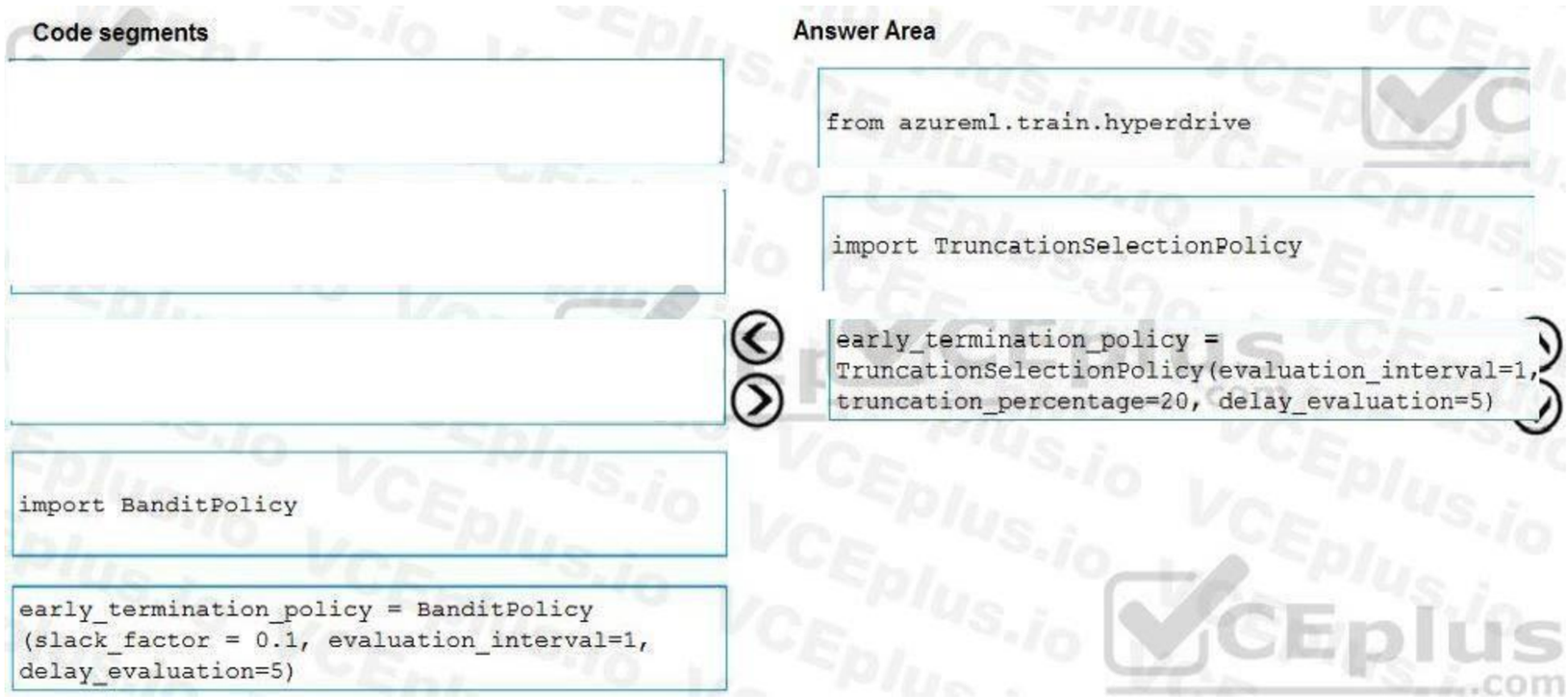


Section:
Explanation:
Box 1: Mutual Information.
The mutual information score is particularly useful in feature selection because it maximizes the mutual information between the joint distribution and target variables in datasets with many dimensions.
Box 2: MedianValue
MedianValue is the feature column, , it is the predictor of the dataset.
Scenario: The MedianValue and AvgRoomsinHouse columns both hold data in numeric format. You need to select a feature selection algorithm to analyze the relationship between the two columns in more detail.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/filter-based-feature-selection

QUESTION 11
DRAG DROP
You need to implement an early stopping criteria policy for model training.
Which three code segments should you use to develop the solution? To answer, move the appropriate code segments from the list of code segments to the answer area and arrange them in the correct order.
NOTE: More than one order of answer choices is correct. You will receive credit for any of the correct orders you select.

Select and Place:

Correct Answer:



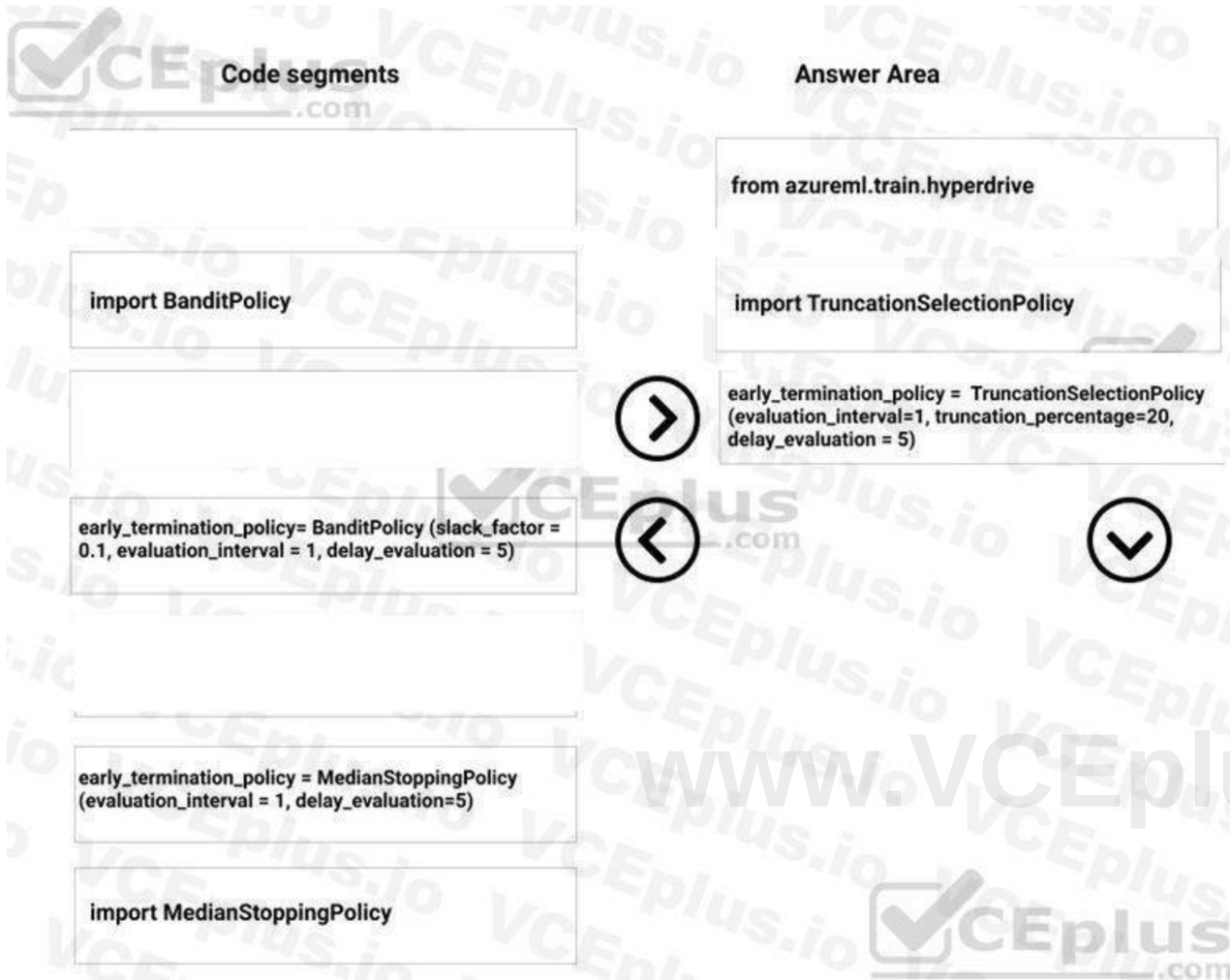
Section:
Explanation:
You need to implement an early stopping criterion on models that provides savings without terminating promising jobs.
Truncation selection cancels a given percentage of lowest performing runs at each evaluation interval. Runs are compared based on their performance on the primary metric and the lowest X% are terminated.
Example:
from azureml.train.hyperdrive import TruncationSelectionPolicy early_termination_policy = TruncationSelectionPolicy(evaluation_interval=1, truncation_percentage=20, delay_evaluation=5)
Incorrect Answers:
Bandit is a termination policy based on slack factor/slack amount and evaluation interval. The policy early terminates any runs where the primary metric is not within the specified slack factor / slack amount with respect to the best performing training run.
Example:
from azureml.train.hyperdrive import BanditPolicy
early_termination_policy = BanditPolicy(slack_factor = 0.1, evaluation_interval=1, delay_evaluation=5
References:
https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-tune-hyperparameters

QUESTION 12
DRAG DROP
You need to implement early stopping criteria as stated in the model training requirements.
Which three code segments should you use to develop the solution? To answer, move the appropriate code segments from the list of code segments to the answer area and arrange them in the correct order.
NOTE: More than one order of answer choices is correct. You will receive the credit for any of the correct orders you select.

Select and Place:

Code segments	Answer Area
early_termination_policy = TruncationSelectionPolicy (evaluation_interval=1, truncation_percentage=20, delay_evaluation = 5)	
import BanditPolicy	
import TruncationSelectionPolicy	
early_termination_policy= BanditPolicy (slack_factor = 0.1, evaluation_interval = 1, delay_evaluation = 5)	
from azureml.train.hyperdrive	
early_termination_policy = MedianStoppingPolicy (evaluation_interval = 1, delay_evaluation=5)	
import MedianStoppingPolicy	

Correct Answer:



Section:

Explanation:

Step 1: from azureml.train.hyperdrive

Step 2: Import TruncationCelectionPolicy

Truncation selection cancels a given percentage of lowest performing runs at each evaluation interval. Runs are compared based on their performance on the primary metric and the lowest X% are terminated.

Scenario: You must configure hyperparameters in the model learning process to speed the learning phase. In addition, this configuration should cancel the lowest performing runs at each evaluation interval, thereby directing effort and resources towards models that are more likely to be successful.

Step 3: early_terminiation_policy = TruncationSelectionPolicy..

Example:

from azureml.train.hyperdrive import TruncationSelectionPolicy

early_termination_policy = TruncationSelectionPolicy(evaluation_interval=1, truncation_percentage=20, delay_evaluation=5)

In this example, the early termination policy is applied at every interval starting at evaluation interval 5. A run will be terminated at interval 5 if its performance at interval 5 is in the lowest 20% of performance of all runs at interval 5.

Incorrect Answers:

Median:

Median stopping is an early termination policy based on running averages of primary metrics reported by the runs. This policy computes running averages across all training runs and terminates runs whose

performance is worse than the median of the running averages.
Slack:
Bandit is a termination policy based on slack factor/slack amount and evaluation interval. The policy early terminates any runs where the primary metric is not within the specified slack factor / slack amount with respect to the best performing training run.
References:
https://docs.microsoft.com/en-us/azure/machine-learning/service/how-to-tune-hyperparameters

Exam E

QUESTION 1
You have a dataset that includes confidential data. You use the dataset to train a model.
You must use a differential privacy parameter to keep the data of individuals safe and private.
You need to reduce the effect of user data on aggregated results.
What should you do?

A. Decrease the value of the epsilon parameter to reduce the amount of noise added to the data
B. Increase the value of the epsilon parameter to decrease privacy and increase accuracy
C. Decrease the value of the epsilon parameter to increase privacy and reduce accuracy
D. Set the value of the epsilon parameter to 1 to ensure maximum privacy

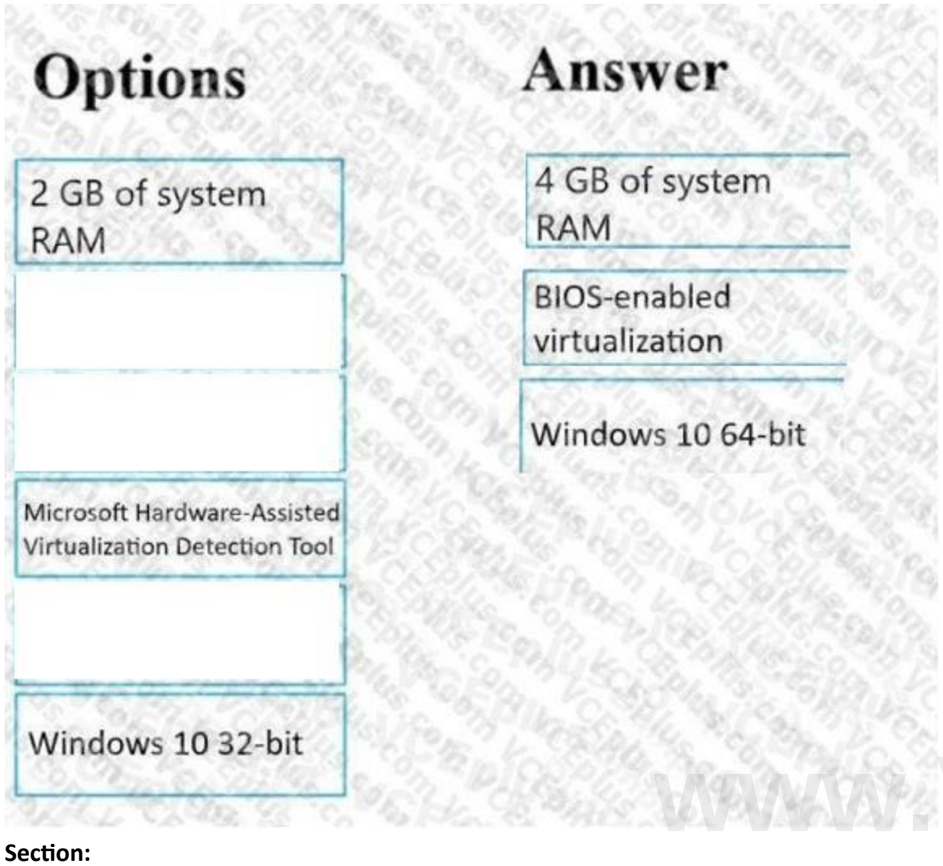
Correct Answer: C
Section:
Explanation:
Differential privacy tries to protect against the possibility that a user can produce an indefinite number of reports to eventually reveal sensitive data. A value known as epsilon measures how noisy, or private, a report is. Epsilon has an inverse relationship to noise or privacy. The lower the epsilon, the more noisy (and private) the data is.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/concept-differential-privacy

QUESTION 2
DRAG DROP
You are planning to host practical training to acquaint staff with Docker for Windows.
Staff devices must support the installation of Docker.
Which of the following are requirements for this installation? Answer by dragging the correct options from the list to the answer area.

Select and Place:

Options	Answer
2 GB of system RAM	
4 GB of system RAM	
BIOS-enabled virtualization	
Microsoft Hardware-Assisted Virtualization Detection Tool	
Windows 10 64-bit	
Windows 10 32-bit	

Correct Answer:



Section:
Explanation:
Reference: https://docs.docker.com/toolbox/toolbox_install_windows/
https://blogs.technet.microsoft.com/canitpro/2015/09/08/step-by-step-enabling-hyper-v-for-use-on-windows-10/
https://docs.docker.com/docker-for-windows/install/

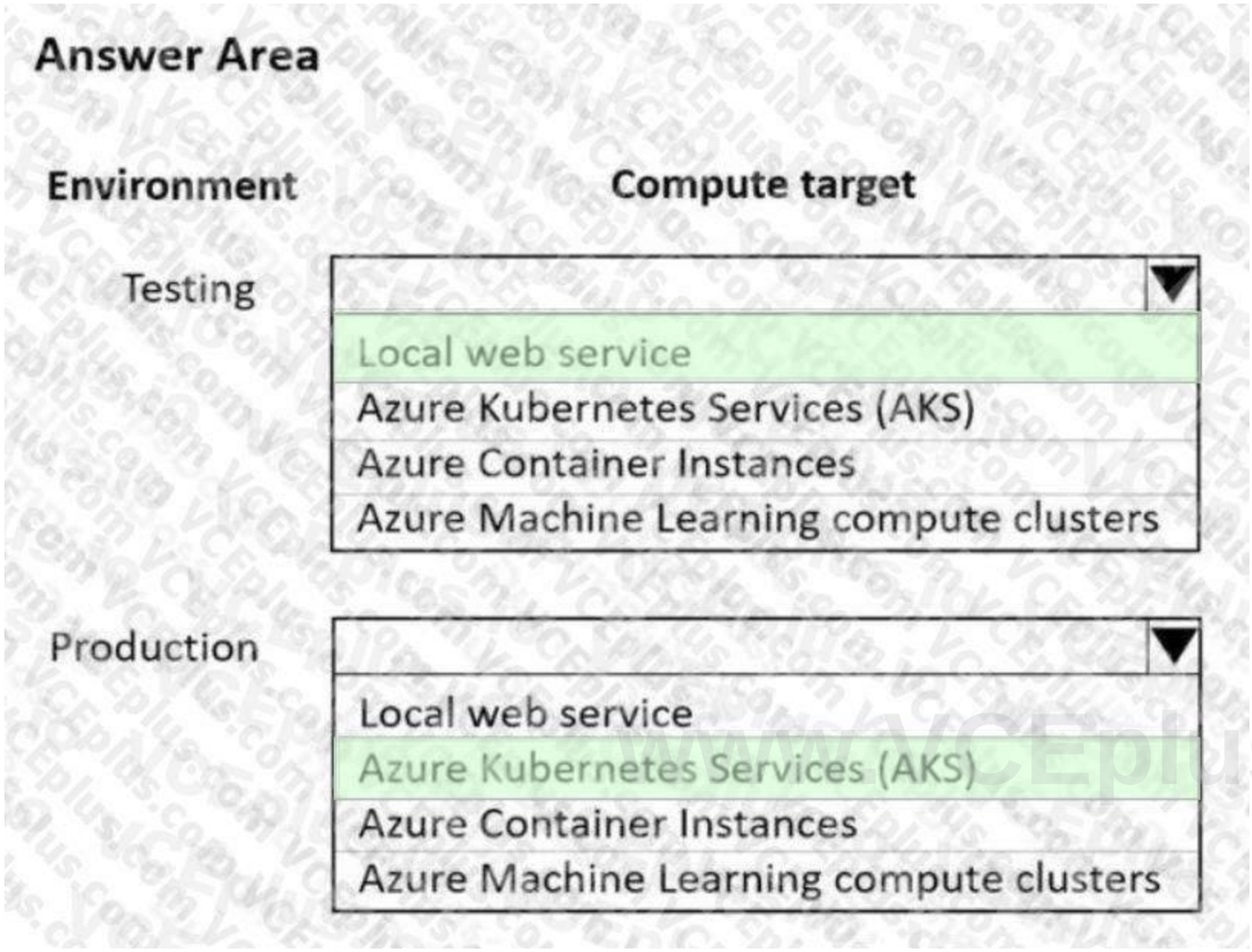
QUESTION 3
HOTSPOT
You are using an Azure Machine Learning workspace. You set up an environment for model testing and an environment for production.
The compute target for testing must minimize cost and deployment efforts. The compute target for production must provide fast response time, autoscaling of the deployed service, and support real-time inferencing.
You need to configure compute targets for model testing and production.
Which compute targets should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

Environment	Compute target
Testing	Local web service Azure Kubernetes Services (AKS) Azure Container Instances Azure Machine Learning compute clusters
Production	Local web service Azure Kubernetes Services (AKS) Azure Container Instances Azure Machine Learning compute clusters

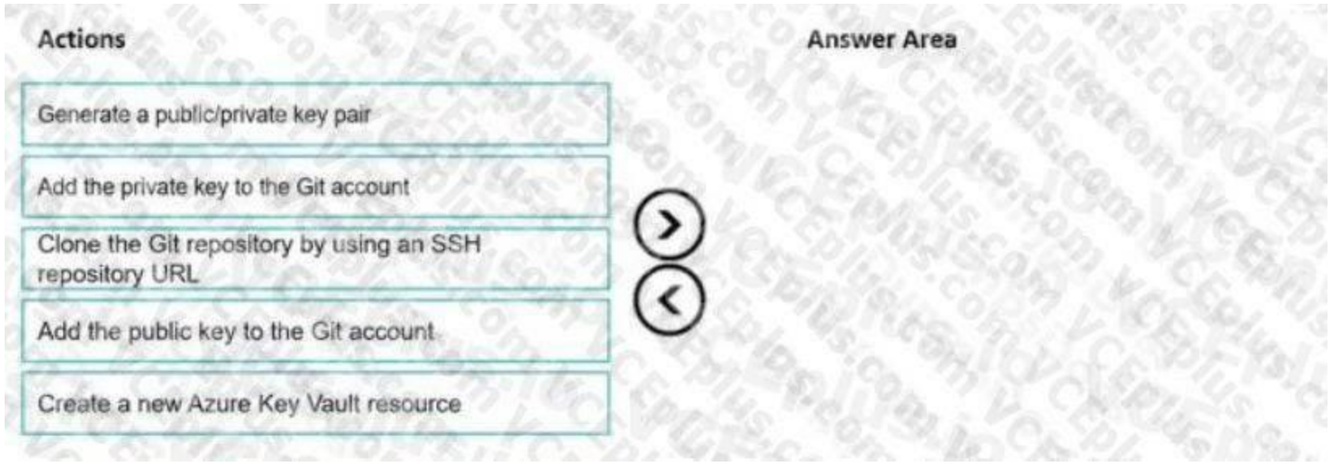
Answer Area:



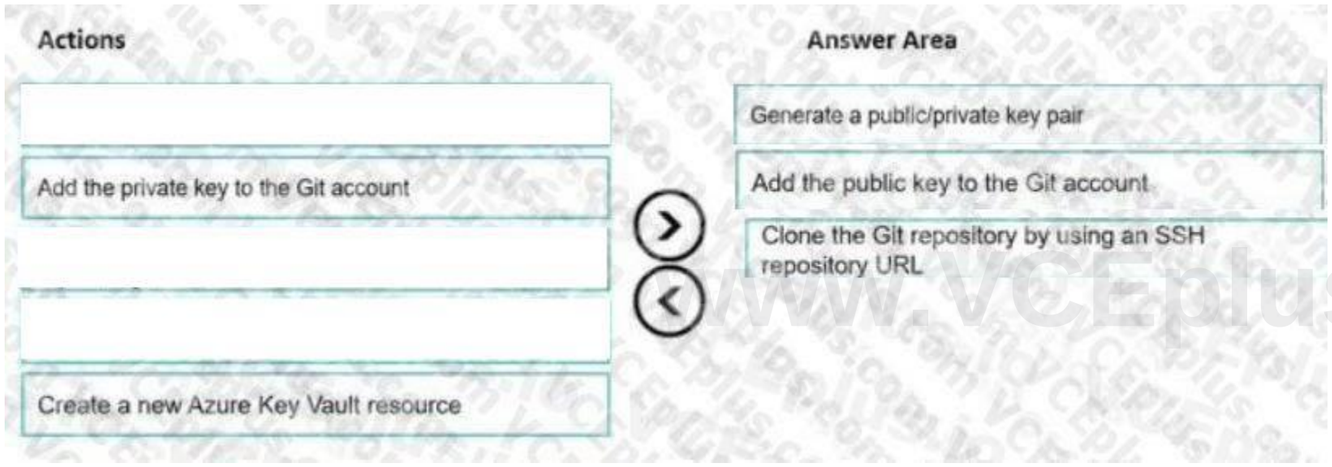
Section:
Explanation:
Box 1: Local web service
The Local web service compute target is used for testing/debugging. Use it for limited testing and troubleshooting. Hardware acceleration depends on use of libraries in the local system.
Box 2: Azure Kubernetes Service (AKS)
Azure Kubernetes Service (AKS) is used for Real-time inference. Recommended for production workloads.
Use it for high-scale production deployments. Provides fast response time and autoscaling of the deployed service
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/concept-compute-target

QUESTION 4
DRAG DROP
You are using a Git repository to track work in an Azure Machine Learning workspace.
You need to authenticate a Git account by using SSH.
Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:

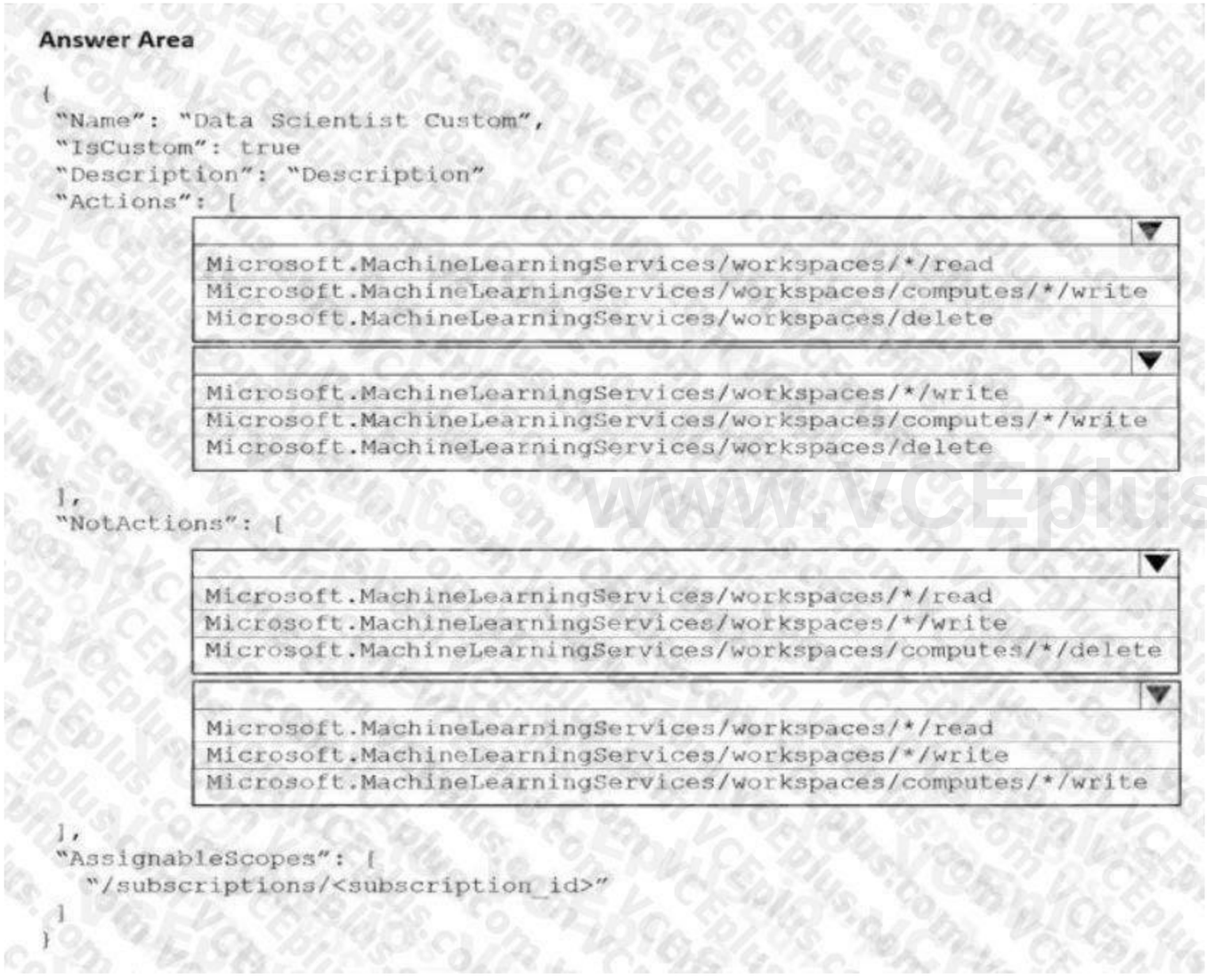


Section:
Explanation:
Authenticate your Git Account with SSH:
Step 1: Generating a public/private key pair
Generate a new SSH key
1. Open the terminal window in the Azure Machine Learning Notebook Tab.
2. Paste the text below, substituting in your email address.
ssh-keygen -t rsa -b 4096 -C "your_email@example.com" This creates a new ssh key, using the provided email as a label.
> Generating public/private rsa key pair.
Step 2: Add the public key to the Git Account
In your terminal window, copy the contents of your public key file.
Step 3: Clone the Git repository by using an SSH repository URL 1. Copy the SSH Git clone URL from the Git repo.
2. Paste the url into the git clone command below, to use your SSH Git repo URL. This will look something like:
git clone git@example.com:GitUser/azureml-example.git Cloning into 'azureml-example'.
Reference: https://docs.microsoft.com/en-us/azure/machine-learning/concept-train-model-git-integration

QUESTION 5
HOTSPOT

You are the owner of an Azure Machine Learning workspace.
You must prevent the creation or deletion of compute resources by using a custom role. You must allow all other operations inside the workspace.
You need to configure the custom role.
How should you complete the configuration? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

Answer Area

```
{
 "Name": "Data Scientist Custom",
 "IsCustom": true
 "Description": "Description"
 "Actions": [
```

[▼]
- Microsoft.MachineLearningServices/workspaces/*/read
- Microsoft.MachineLearningServices/workspaces/computes/*/write
- Microsoft.MachineLearningServices/workspaces/delete

[▼]
- Microsoft.MachineLearningServices/workspaces/*/write
- Microsoft.MachineLearningServices/workspaces/computes/*/write
- Microsoft.MachineLearningServices/workspaces/delete

```
 ],
 "NotActions": [
```

[▼]
- Microsoft.MachineLearningServices/workspaces/*/read
- Microsoft.MachineLearningServices/workspaces/*/write
- Microsoft.MachineLearningServices/workspaces/computes/*/delete

[▼]
- Microsoft.MachineLearningServices/workspaces/*/read
- Microsoft.MachineLearningServices/workspaces/*/write
- Microsoft.MachineLearningServices/workspaces/computes/*/write

```
 ],
 "AssignableScopes": [
   "/subscriptions/<subscription_id>"
 ]
}
```

Section:
Explanation:
Box 1: Microsoft.MachineLearningServices/workspaces/*/read
Reader role: Read-only actions in the workspace. Readers can list and view assets, including datastore credentials, in a workspace. Readers can't create or update these assets.
Box 2: Microsoft.MachineLearningServices/workspaces/*/write
If the roles include Actions that have a wildcard (*), the effective permissions are computed by subtracting the NotActions from the allowed Actions.
Box 3: Box 2: Microsoft.MachineLearningServices/workspaces/computes/*/delete
Box 4: Microsoft.MachineLearningServices/workspaces/computes/*/write
Reference: https://docs.microsoft.com/en-us/azure/role-based-access-control/overview#how-azure-rbac-determines-if-a-user-has-access-to-a-resource

QUESTION 6
HOTSPOT
You create an Azure Machine Learning workspace named workspace1. You assign a custom role to a user of workspace1.
The custom role has the following JSON definition:

```
{
  "Name": "MyRole",
  "IsCustom": true,
  "Description": "New custom role description.",
  "Actions": ["*"],
  "NotActions": [
    "Microsoft.MachineLearningServices/workspaces/write",
    "Microsoft.MachineLearningServices/workspaces/computes/*/write",
    "Microsoft.MachineLearningServices/workspaces/computes/*/delete",
    "Microsoft. Authorization/*/write"
  ],
  "AssignableScopes": [
    "/subscriptions/<subscription_id>/resourceGroups/resourcegroup1/providers/
    Microsoft.MachineLearningServices/workspaces/workspace1"
  ]
}
```

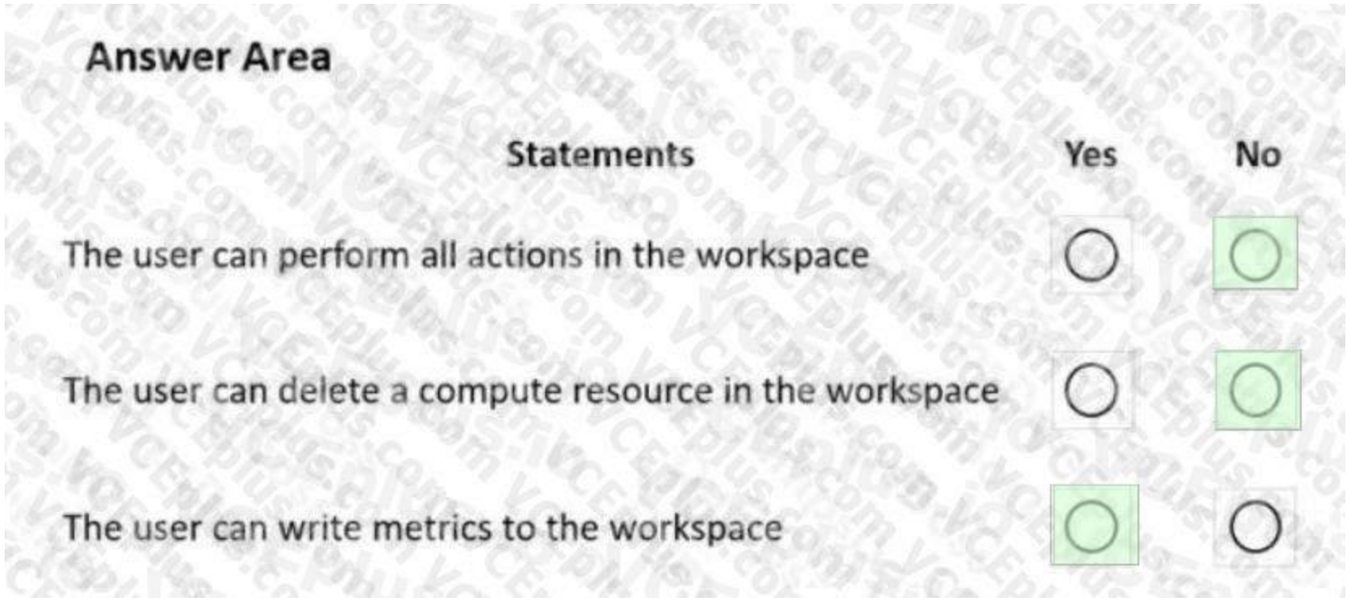
Instructions: For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

Statements	Yes	No
The user can perform all actions in the workspace	○	○
The user can delete a compute resource in the workspace	○	○
The user can write metrics to the workspace	○	○

Answer Area:

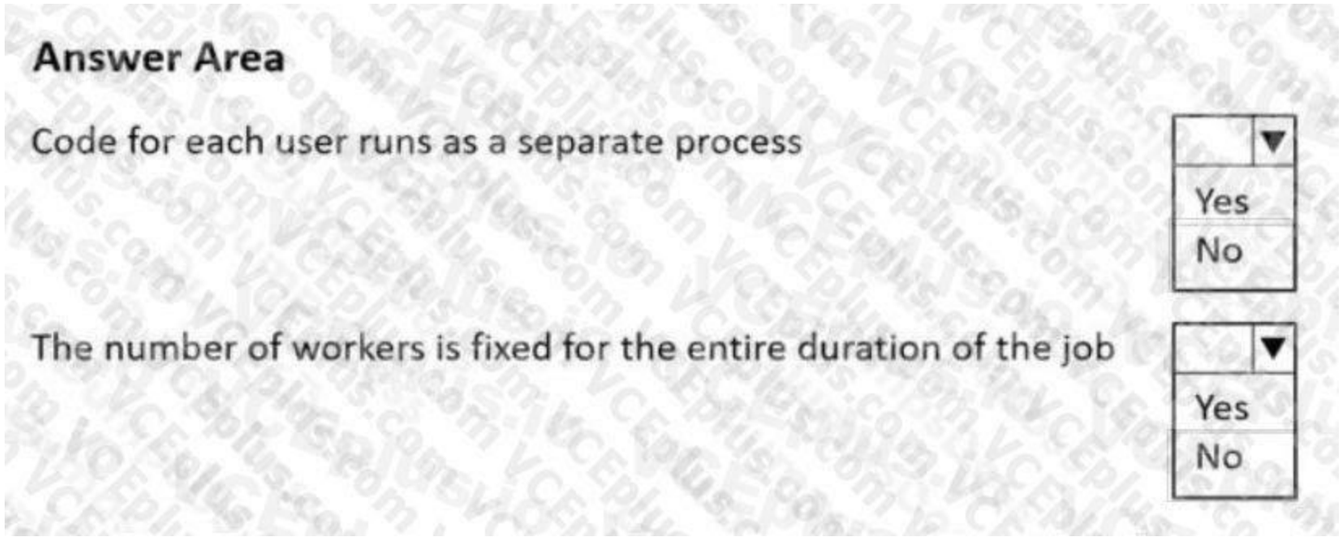


Section:
Explanation:
Box 1: No
The actions listed in NotActions are prohibited.
If the roles include Actions that have a wildcard (*), the effective permissions are computed by subtracting the NotActions from the allowed Actions.
Box 2: No
Deleting compute resources in the workspace is in the NotActions list.
Box 3: Yes
Writing metrics is not listed in NotActions.
Reference: https://docs.microsoft.com/en-us/azure/role-based-access-control/overview#how-azure-rbac-determines-if-a- user-has-access-to-a-resource

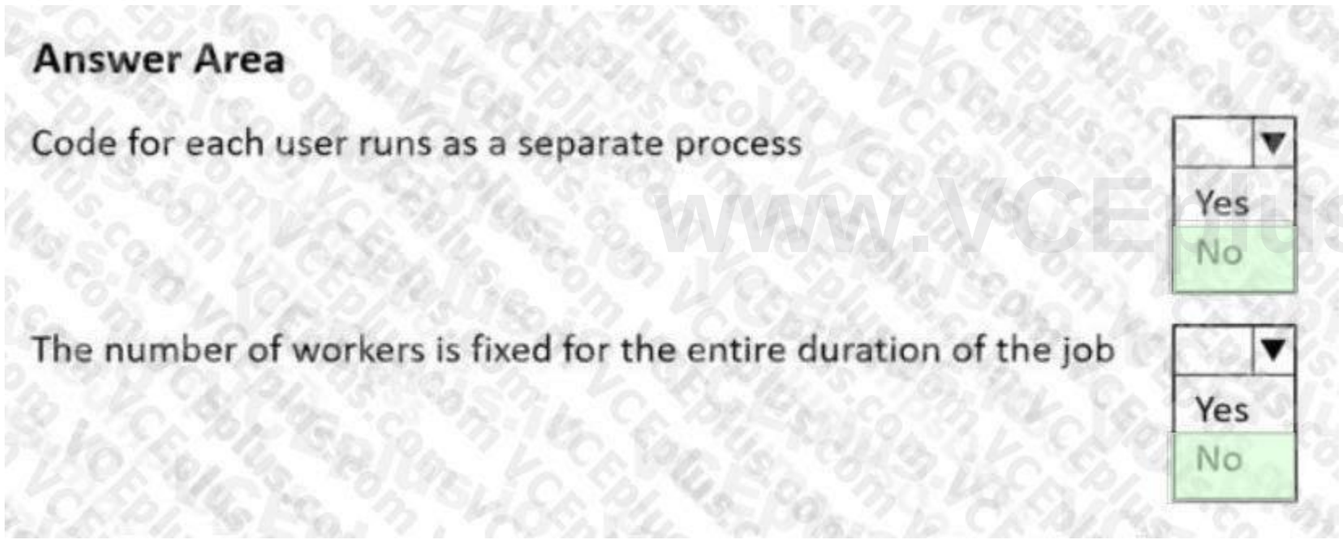
QUESTION 7
HOTSPOT
You create a new Azure Databricks workspace.
You configure a new cluster for long-running tasks with mixed loads on the compute cluster as shown in the image below.

Use the drop-down menus to select the answer choice that completes each statement based on the information presented in the graphic.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:



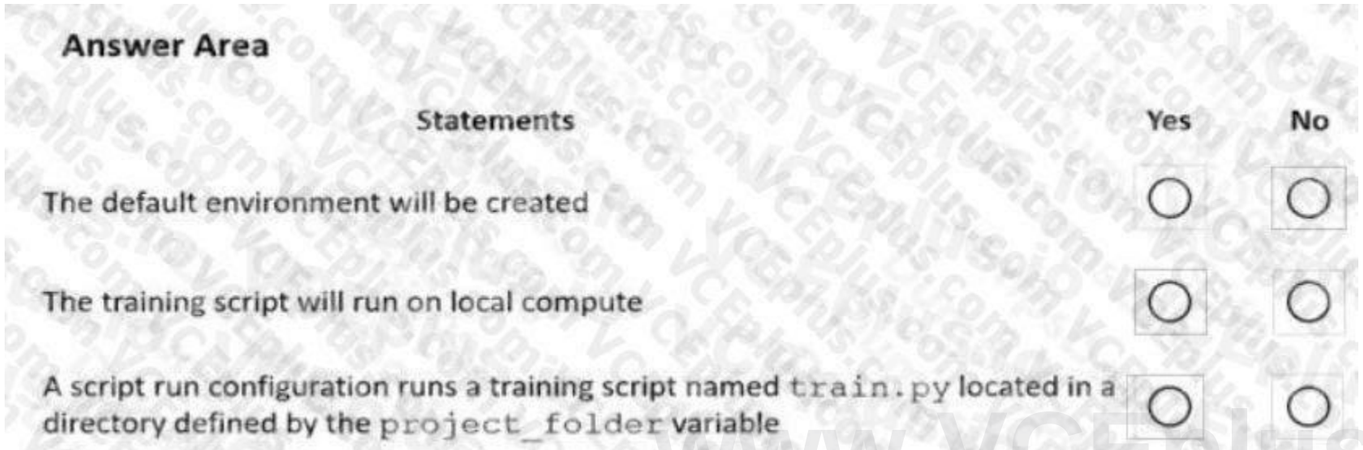
Section:
Explanation:
Box 1: No
Running user code in separate processes is not possible in Scala.
Box 2: No
Autoscaling is enabled. Minimum 2 workers, Maximum 8 workers.
Reference:
https://docs.databricks.com/clusters/configure.html

QUESTION 8
HOTSPOT
You use an Azure Machine Learning workspace.
You create the following Python code:

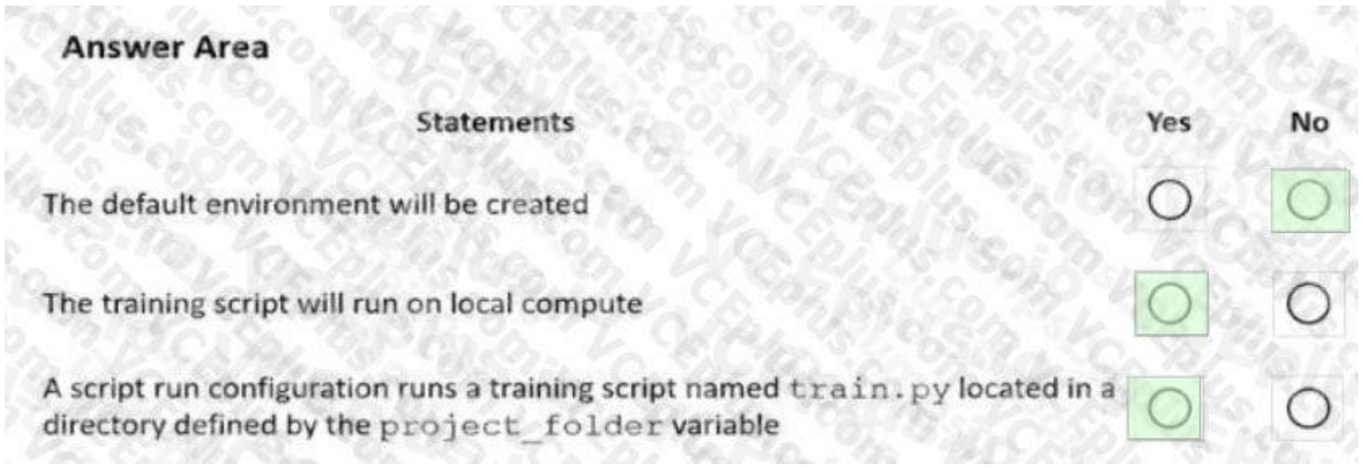
```
from azureml.core import ScriptRunConfig
src = ScriptRunConfig(source_directory=project_folder,
                      script='train.py'
                      environment=myenv)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:



Section:
Explanation:
Box 1: No
Environment is a required parameter. The environment to use for the run. If no environment is specified, azureml.core.runconfig.DEFAULT_CPU_IMAGE will be used as the Docker image for the run.
The following example shows how to instantiate a new environment. from azureml.core import Environment myenv =
Environment(name="myenv")
Box 2: Yes

Parameter compute_target: The compute target where training will happen. This can either be a ComputeTarget object, the name of an existing ComputeTarget, or the string "local". If no compute target is specified, your local machine will be used.
Box 3: Yes
Parameter source_directory. A local directory containing code files needed for a run.
Parameter script. The file path relative to the source_directory of the script to be run.
Reference: https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.scriptrunconfig
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.environment.environment

QUESTION 9
HOTSPOT
You create a Python script named train.py and save it in a folder named scripts. The script uses the scikit-learn framework to train a machine learning model.
You must run the script as an Azure Machine Learning experiment on your local workstation.
You need to write Python code to initiate an experiment that runs the train.py script.
How should you complete the code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

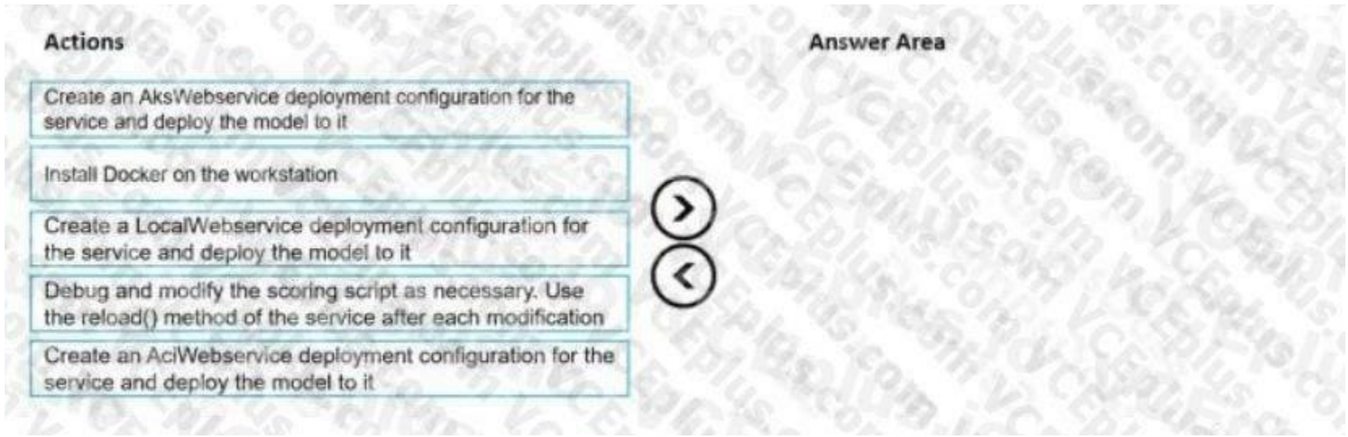
Hot Area:

Answer Area:

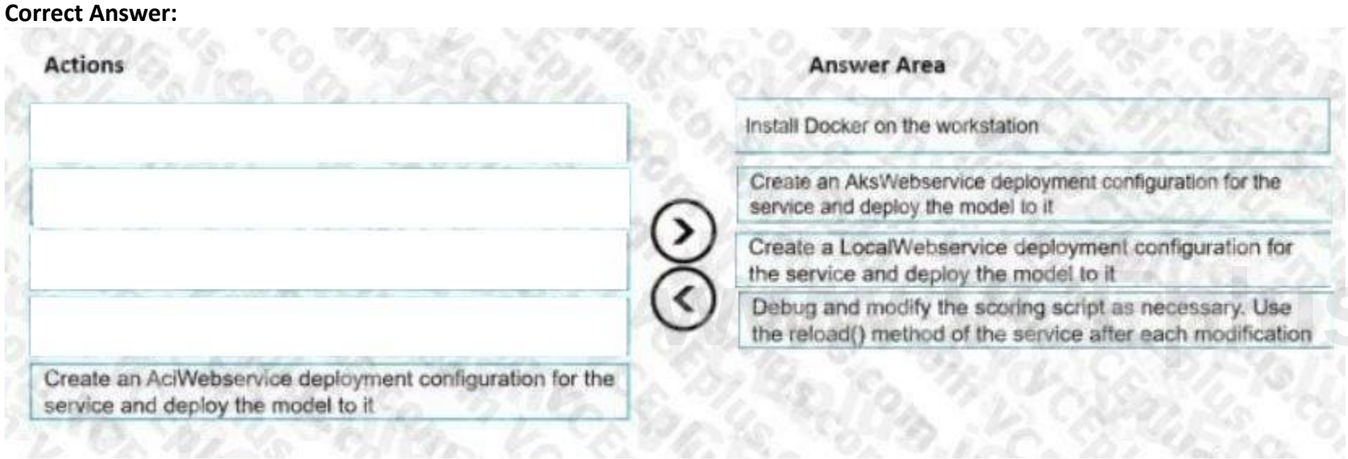
Section:
Explanation:
Box 1: source_directory source_directory: A local directory containing code files needed for a run.
Box 2: script
Script: The file path relative to the source_directory of the script to be run.
Box 3: environment
Reference:
https://docs.microsoft.com/en-us/python/api/azureml-core/azureml.core.scriptrunconfig

QUESTION 10
DRAG DROP
You train and register a model by using the Azure Machine Learning SDK on a local workstation. Python 3.6 and Visual Studio Code are installed on the workstation.
When you try to deploy the model into production as an Azure Kubernetes Service (AKS)-based web service, you experience an error in the scoring script that causes deployment to fail.
You need to debug the service on the local workstation before deploying the service to production.
Which four actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:

Explanation:

Step 1: Install Docker on the workstation

Prerequisites include having a working Docker installation on your local system. Build or download the dockerfile to the compute node.

Step 2: Create an AksWebservice deployment configuration and deploy the model to it To deploy a model to Azure Kubernetes Service, create a deployment configuration that describes the compute resources needed.

If deploying to a cluster configured for dev/test, ensure that it was created with enough # cores and memory to handle this deployment configuration. Note that memory is also used by # things such as dependencies and AML components.

deployment_config = AksWebservice.deploy_configuration(cpu_cores = 1, memory_gb = 1) service = Model.deploy(ws, "myservice", [model], inference_config, deployment_config, aks_target) service.wait_for_deployment(show_output = True) print(service.state) print(service.get_logs())

Step 3: Create a LocalWebservice deployment configuration for the service and deploy the model to it

To deploy locally, modify your code to use LocalWebservice.deploy_configuration() to create a deployment configuration.

Then use Model.deploy() to deploy the service.

Step 4: Debug and modify the scoring script as necessary. Use the reload() method of the service after each modification.

During local testing, you may need to update the score.py file to add logging or attempt to resolve any problems that you've discovered. To reload changes to the score.py file, use reload(). For example, the following code reloads the script for the service, and then sends data to it.

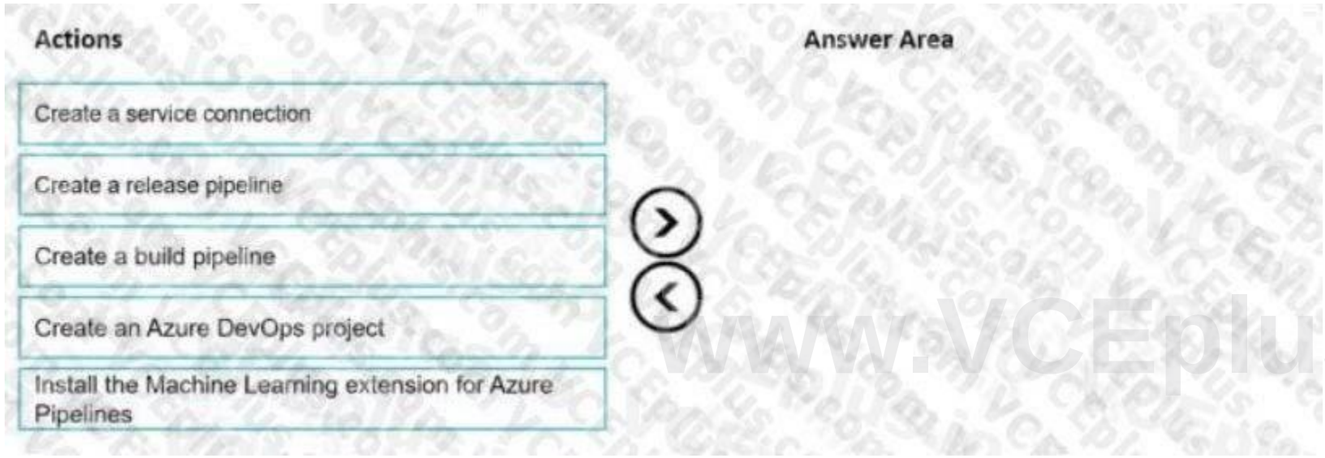
Incorrect Answers:

AciWebservice: The types of web services that can be deployed are LocalWebservice, which will deploy a model locally, and AciWebservice and AksWebservice, which will deploy a model to Azure Container

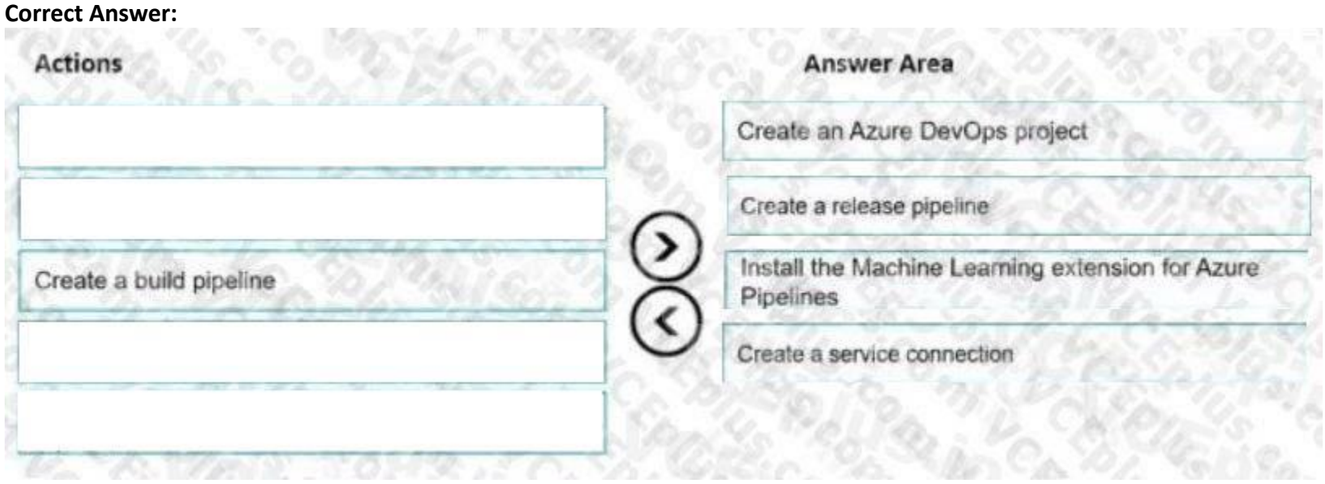
Instances (ACI) and Azure
Kubernetes Service (AKS), respectively.
Reference:
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-deploy-azure-kubernetes-service
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-troubleshoot-deployment-local

QUESTION 11
DRAG DROP
You create an Azure Machine Learning workspace and a new Azure DevOps organization. You register a model in the workspace and deploy the model to the target environment.
All new versions of the model registered in the workspace must automatically be deployed to the target environment.
You need to configure Azure Pipelines to deploy the model.
Which four actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:

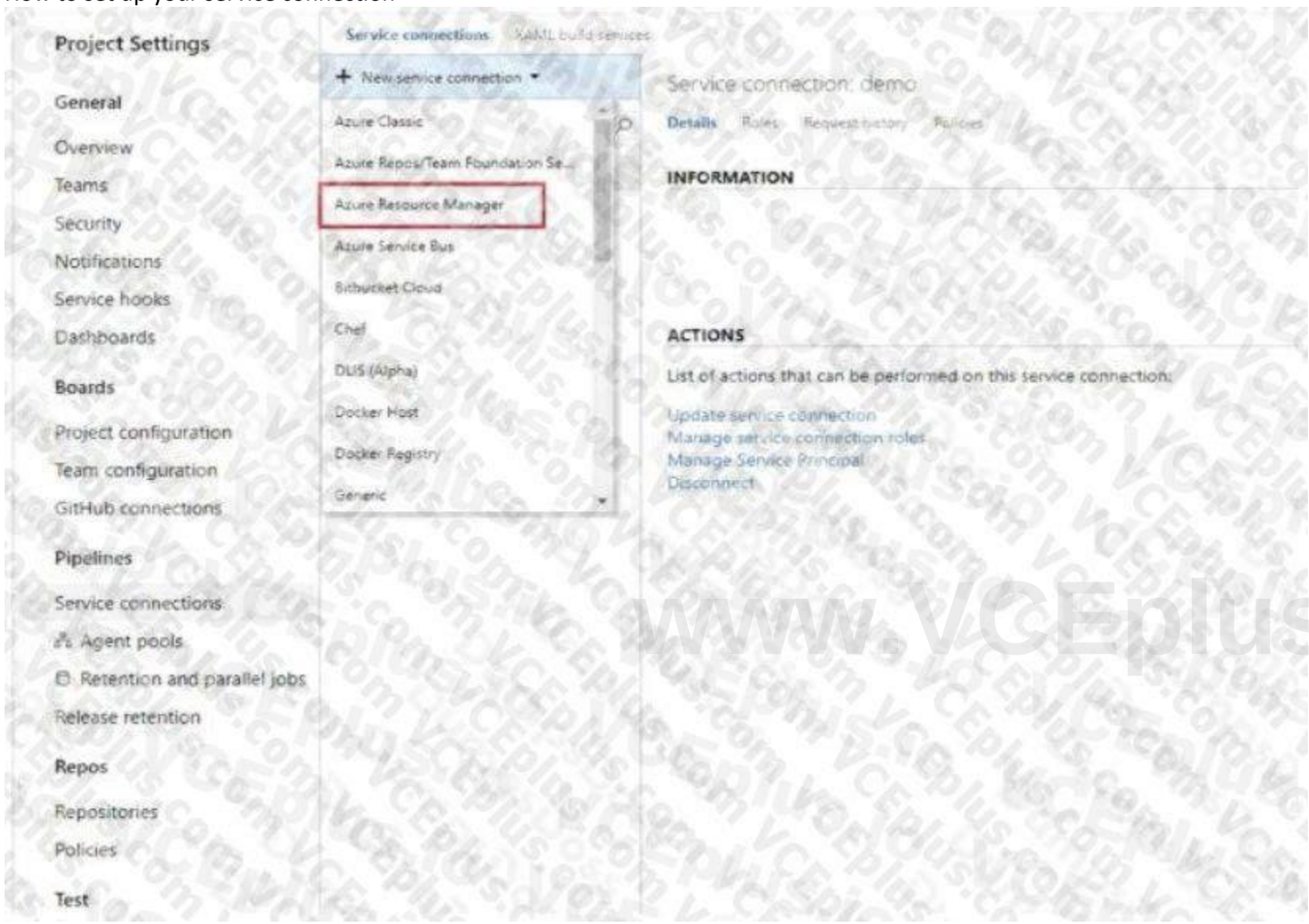


Correct Answer:

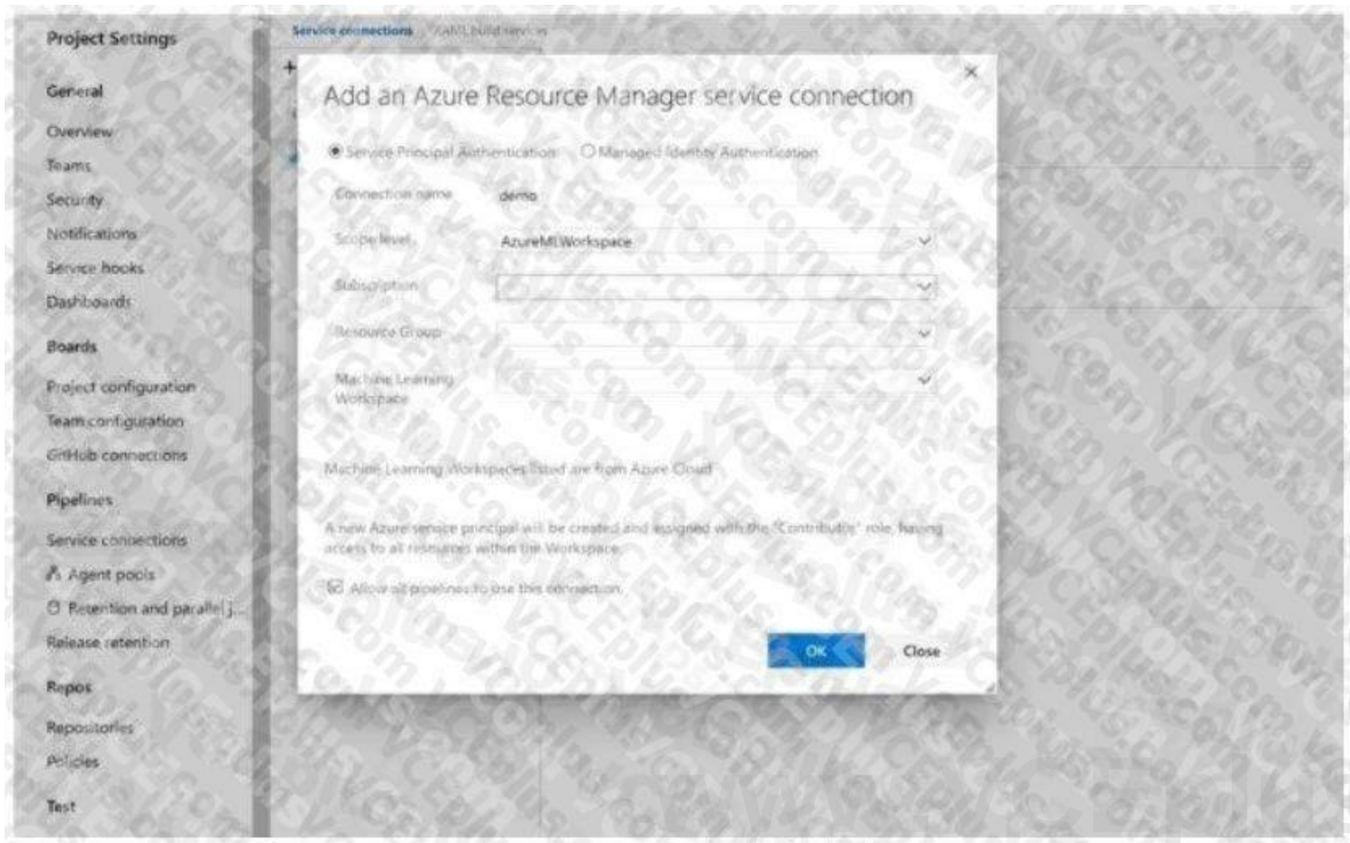


Section:
Explanation:
Step 1: Create an Azure DevOps project
Step 2: Create a release pipeline

1. Sign in to your Azure DevOps organization and navigate to your project.
2. Go to Pipelines, and then select New pipeline.
Step 3: Install the Machine Learning extension for Azure Pipelines You must install and configure the Azure CLI and ML extension.
Step 4: Create a service connection
How to set up your service connection



Select AzureMLWorkspace for the scope level, then fill in the following subsequent parameters.



Note: How to enable model triggering in a release pipeline
Go to your release pipeline and add a new artifact. Click on AzureML Model artifact then select the appropriate AzureML service connection and select from the available models in your workspace. Enable the deployment trigger on your model artifact as shown here. Every time a new version of that model is registered, a release pipeline will be triggered.
Reference:
https://marketplace.visualstudio.com/items?itemName=ms-air-aiagility.vss-services-azureml https://docs.microsoft.com/en- us/azure/devops/pipelines/targets/azure-machine-learning

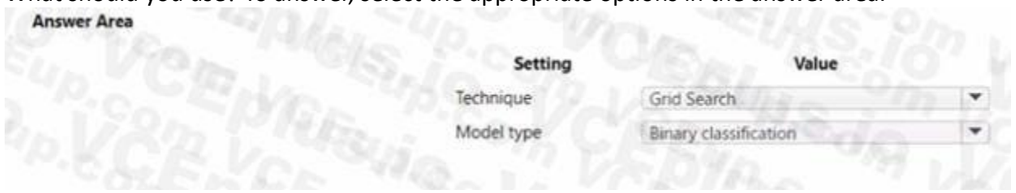
QUESTION 12
You use the Azure Machine Learning Python SDK to create a batch inference pipeline.
You must publish the batch inference pipeline so that business groups in your organization can use the pipeline. Each business group must be able to specify a different location for the data that the pipeline submits to the model for scoring.
You need to publish the pipeline.
What should you do?

A. Create multiple endpoints for the published pipeline service and have each business group submit jobs to its own endpoint.
B. Define a PipelineParameter object for the pipeline and use it to specify the business group-specific input dataset for each pipeline run.
C. Define a OutputFileDatasetConfig object for the pipeline and use the object to specify the business group-specific input dataset for each pipeline run.
D. Have each business group run the pipeline on local compute and use a local file for the input data.

Correct Answer: C
Section:

QUESTION 13

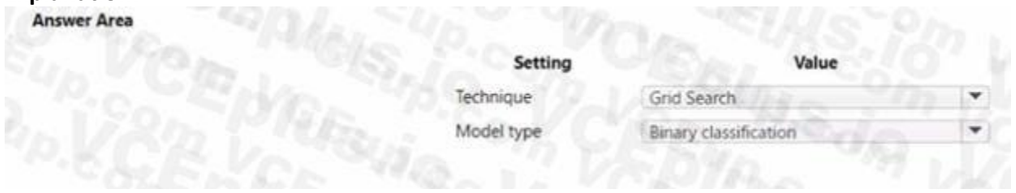
You have machine learning models produce unfair predictions across sensitive features.
You must use a post-processing technique to apply a constraint to the models to mitigate their unfairness.
You need to select a post-processing technique and model type.
What should you use? To answer, select the appropriate options in the answer area.



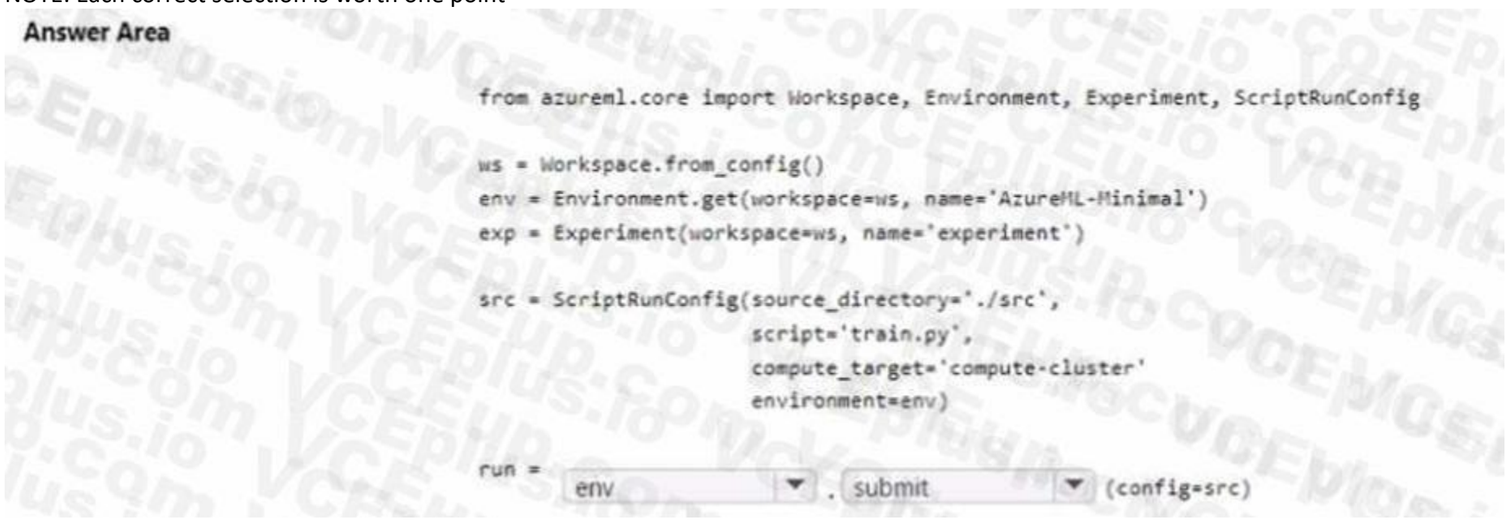
NOTE: Each correct selection is worth one point.

A. See below image

Correct Answer: A
Section:
Explanation:



QUESTION 14
You have an Azure Machine Learning workspace
You plan to use the Azure Machine Learning SDK for Python v1 to submit a job to run a training script.
You need to complete the script to ensure that it will execute the training script.
How should you complete the script? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point



A. See below image

Correct Answer: A
Section:
Explanation:

Answer Area

```
from azureml.core import Workspace, Environment, Experiment, ScriptRunConfig

ws = Workspace.from_config()
env = Environment.get(workspace=ws, name='AzureML-Minimal')
exp = Experiment(workspace=ws, name='experiment')

src = ScriptRunConfig(source_directory='./src',
                      script='train.py',
                      compute_target='compute-cluster'
                      environment=env)

run = [env] . [submit] (config=src)
```

QUESTION 15
You create an Azure Machine Learning workspace. You train an MLflow-formatted regression model by using tabular structured data.
You must use a Responsible Al dashboard to assess the model.
You need to use the Azure Machine Learning studio Ul to generate the Responsible A dashboard.
What should you do first?

A. Deploy the model to a managed online endpoint.
B. Register the model with the workspace.
C. Create the model explanations.
D. Convert the model from the MLflow format to a custom format.

Correct Answer: B
Section:
Explanation:

QUESTION 16
You have an Azure Machine Learning workspace named workspaces.
You must add a datastore that connects an Azure Blob storage container to workspaces. You must be able to configure a privilege level.
You need to configure authentication.
Which authentication method should you use?

A. Account key
B. SAS token
C. Service principal
D. Managed identity

Correct Answer: D
Section:

QUESTION 17
You are developing a machine learning model.
You must inference the machine learning model for testing.
You need to use a minimal cost compute target
Which two compute targets should you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point

A. Local web service
B. Remote VM
C. Azure Databricks
D. Azure Machine Learning Kubernetes
E. Azure Container Instances

Correct Answer: A, E
Section:

QUESTION 18
You are creating a compute target to train a machine learning experiment.
The compute target must support automated machine learning, machine learning pipelines, and Azure Machine Learning designer training.
You need to configure the compute target
Which option should you use?

A. Azure HDInsight
B. Azure Machine Learning compute cluster
C. Azure Batch
D. Remote VM

Correct Answer: B
Section:

QUESTION 19
You create an Azure Machine Learning workspace. You use the Azure Machine Learning SDK for Python.
You must create a dataset from remote paths. The dataset must be reusable within the workspace.
You need to create the dataset.
How should you complete the following code segment? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

A. See below image

Answer Area

```
from azureml.core import Dataset
from azureml.data.dataset_factory import DataType
web_paths = ['https://domain.blob.core.windows.net/demo/dataset1.tsv',
 'https://domain.blob.core.windows.net/demo/dataset2.tsv']
 ds = Dataset.      Tabular.from_parquet_files      (path=web_paths)
 ds = ds.      unregister_all_versions      (workspace=workspace,
                name='ds',
                description='training data')
```

Correct Answer: A
Section:

QUESTION 20
You manage an Azure Machine Learning workspace by using the Azure CLI ml extension v2. You need to define a YAML schema to create a compute cluster. Which schema should you use?

A. https://azuremlschemas.azureedge.net/latest/computdnstarKeichema.json
B. https://azuremlschemas.azureedge.net/latest/amlCompute.schemajson
C. https://azuremlschemas.azureedge.net/latest/vmCompute.schema.json
D. https://azuremlschemas.azureedge.net/latest/kubernetesCompute.schema.json

Correct Answer: B
Section:

QUESTION 21
You are developing a machine learning model by using Azure Machine Learning. You are using multiple text files in tabular format for model dat a. You have the following requirements:
• You must use AutoML jobs to train the model.
• You must use data from specified columns.
• The data concept must support lazy evaluation.
You need to load data into a Pandas dataframe.
Which data concept should you use?

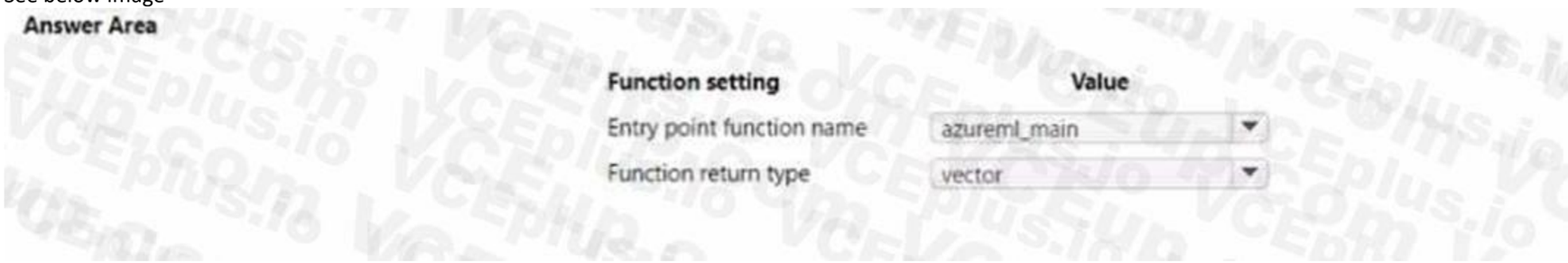
A. Data asset
B. URI
C. Datastore
D. MLTable

Correct Answer: D
Section:

QUESTION 22
You create an Azure Machine Learning dataset containing automobile price dat a. The dataset includes 10.000 rows and 10 columns. You use the Azure Machine Learning designer to transform the dataset by using

an Execute Python Script component and custom code.
The code must combine three columns to create a new column.
You need to configure the code function.
Which configurations should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

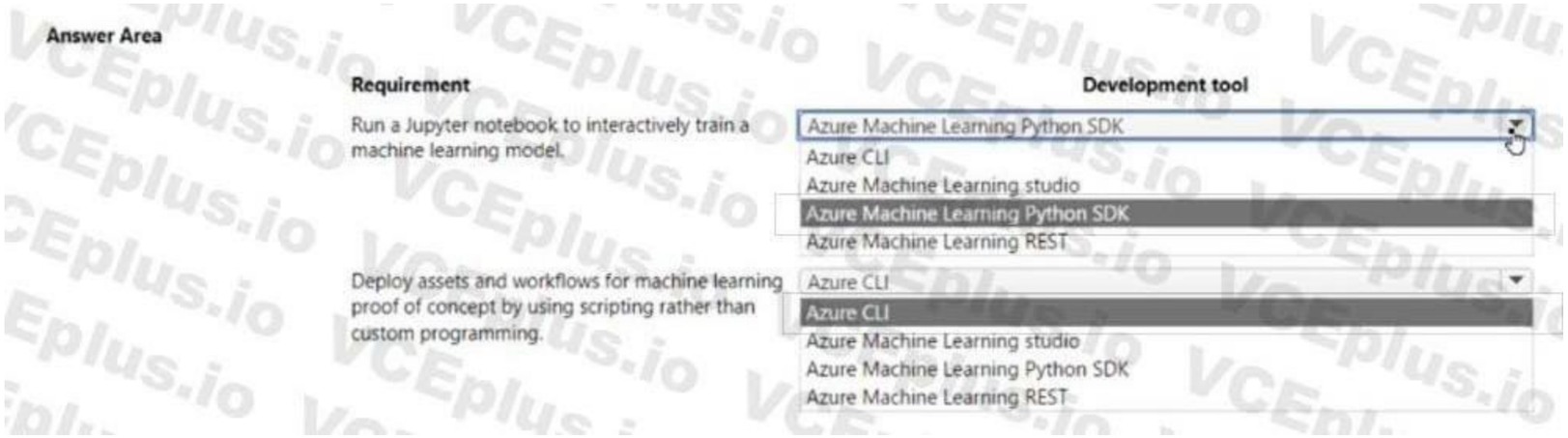
A. See below image



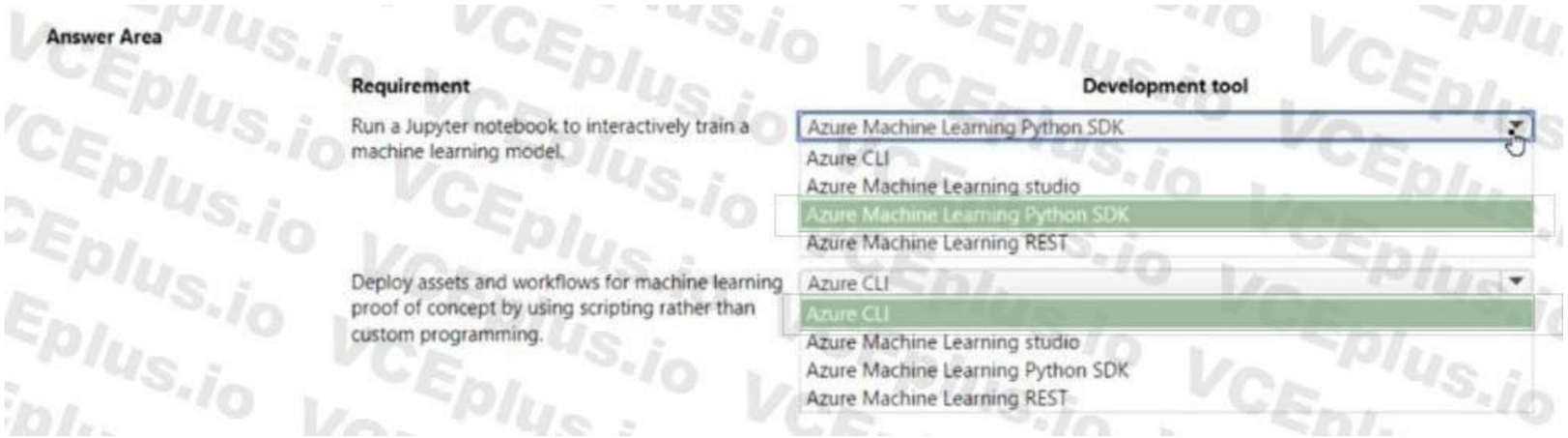
Correct Answer: A
Section:

QUESTION 23
HOTSPOT
You plan to implement an Azure Machine Learning solution. You have the following requirements:
• Run a Jupyter notebook to interactively tram a machine learning model.
• Deploy assets and workflows for machine learning proof of concept by using scripting rather than custom programming.
You need to select a development technique for each requirement
Which development technique should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

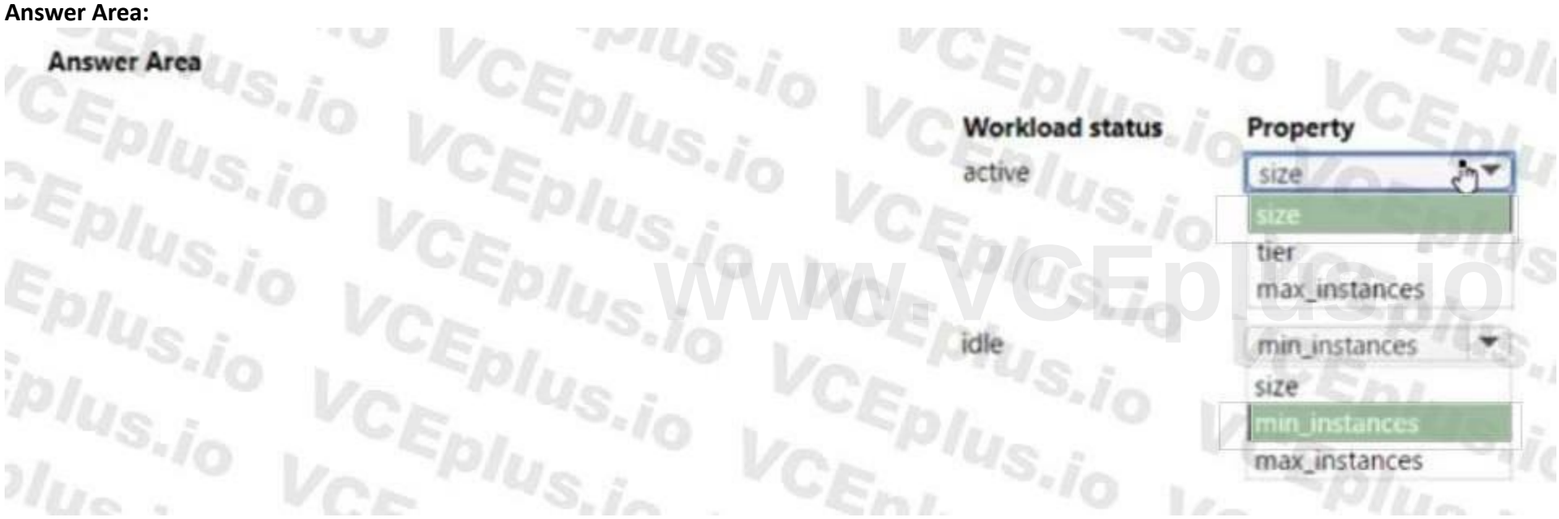


Section:
Explanation:

QUESTION 24
HOTSPOT
You manage an Azure Machine Learning workspace by using the Python SDK v2.
You must create a compute cluster in the workspace. The compute cluster must run workloads and properly handle interruptions. You start by calculating the maximum amount of compute resources required by the workloads and size the cluster to match the calculations.
The cluster definition includes the following properties and values:
• name="mlcluster1''
• size="STANDARD.DS3.v2"
• min_instances=1
• maxjnstances=4
• tier="dedicated" The cost of the compute resources must be minimized when a workload is active Of idle. Cluster property changes must not affect the maximum amount of compute resources available to the workloads run on the cluster.
You need to modify the cluster properties to minimize the cost of compute resources.
Which properties should you modify? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

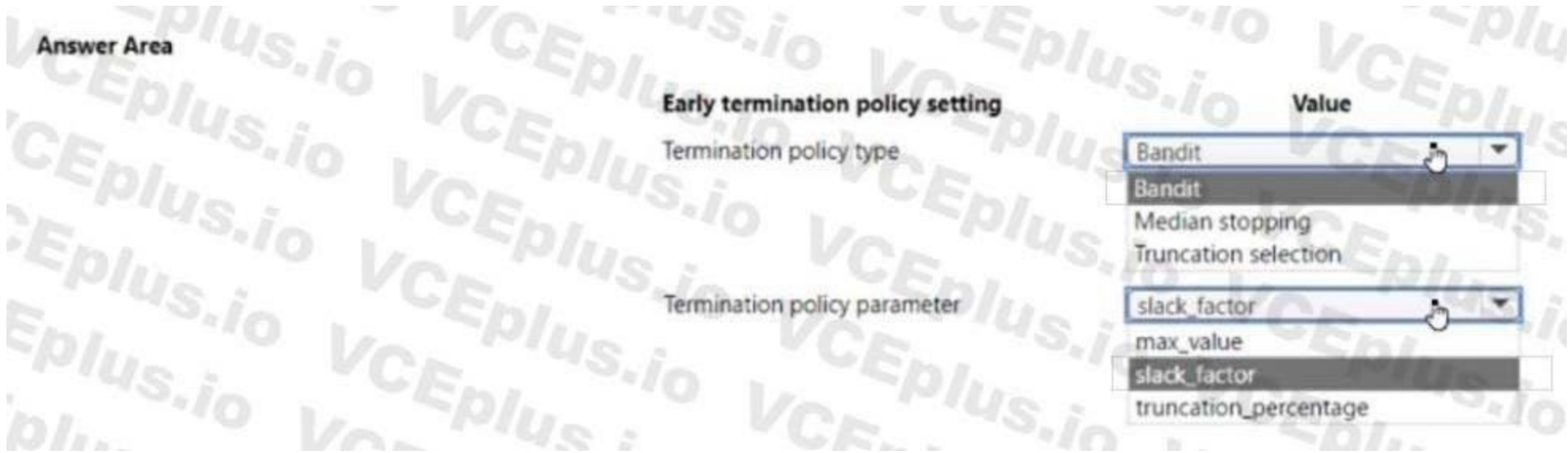
Answer Area:



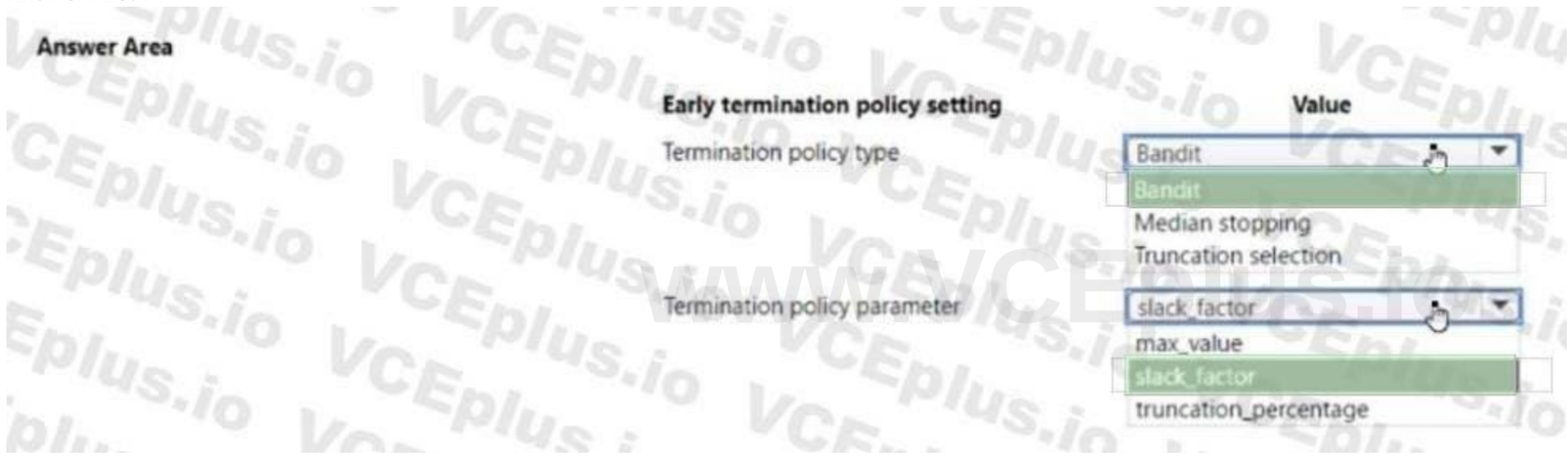
Section:
Explanation:

QUESTION 25
HOTSPOT
You use Azure Machine Learning to implement hyperparameter tuning for an Azure ML Python SDK v2-based model training.
Training runs must terminate when the primary metric is lowered by 25 percent or more compared to the best performing run.
You need to configure an early termination policy to terminate training jobs.
Which values should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



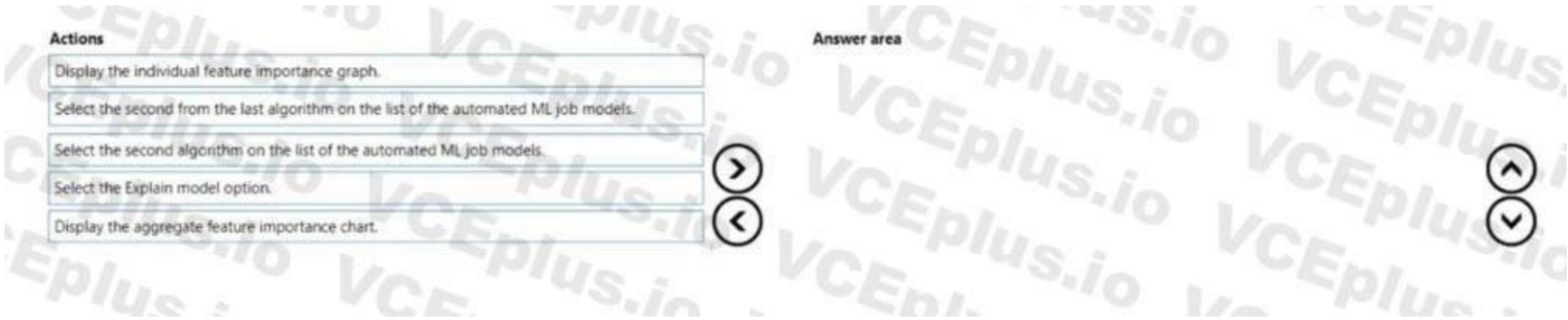
Answer Area:



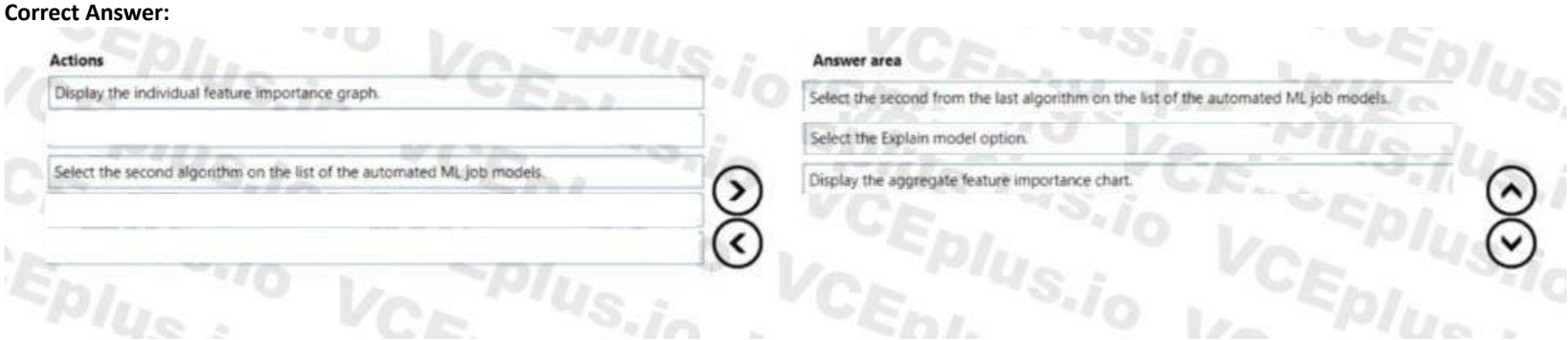
Section:
Explanation:

QUESTION 26
DRAG DROP
You create an Azure Machine Learning workspace. You are training a classification model with nocode AutoML in Azure Machine Learning studio.
The model must predict if a client of a financial institution will subscribe to a fixed-term deposit. You must identify the feature that has the most influence on the predictions of the model for the second highest scoring algorithm. You must minimize the effort and time to identify the feature.
You need to complete the identification.
Which three actions should you perform in sequence? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:



Section:
Explanation:

QUESTION 27
You create a workspace by using Azure Machine Learning Studio.
You must run a Python SDK v2 notebook in the workspace by using Azure Machine Learning Studio.
You must preserve the current values of variables set in the notebook for the current instance.
You need to maintain the state of the notebook.
What should you do?

A. Change the compute.
B. Change the current kernel
C. Stop the compute.
D. Stop the current kernel.

Correct Answer: B
Section:

QUESTION 28
You are implementing hyperparameter tuning by using Bayesian sampling for an Azure ML Python SDK v2-based model training from a notebook. The notebook is in an Azure Machine Learning workspace. The notebook uses a training script that runs on a compute cluster with 20 nodes.
The code implements Bandit termination policy with slack_factor set to 02 and a sweep job with max_concurrent_trials set to 10.
You must increase effectiveness of the tuning process by improving sampling convergence.
You need to select which sampling convergence to use.
What should you select?

A. Set the value of slack.factor of earty.termination policy to 0.1.
B. Set the value of max_concurrent_trials to 4.
C. Set the value of slack_factor of eartyjermination policy to 0.9.
D. Set the value of max.concurrentjrials to 20.

Correct Answer: C
Section:

QUESTION 29
HOTSPOT
You create an Azure Machine Learning workspace and install the MLflow library.
You need to tog different types of data by using the MLflow library.
Which method should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

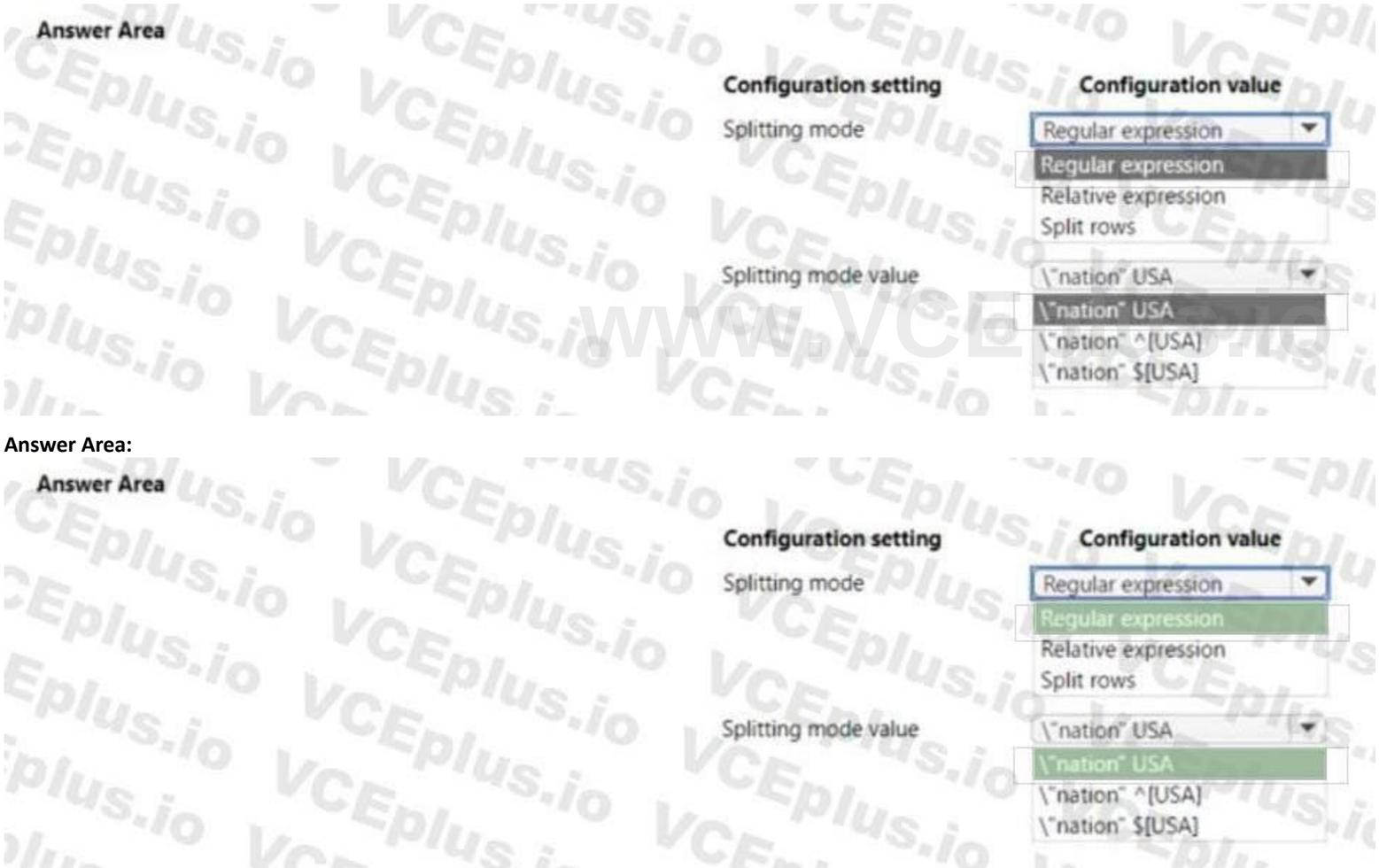
Hot Area:

Answer Area:

Section:
Explanation:

QUESTION 30
HOTSPOT
You are using The Azure Machine Learning designer to transform a dataset containing the census data of all nations.
You must use the Split Data component to separate the dataset into two datasets. The first dataset must contain the census data of the United States. The second dataset must include the census data of the remaining nations.
You need to configure the component to create the datasets.
Which configuration values should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

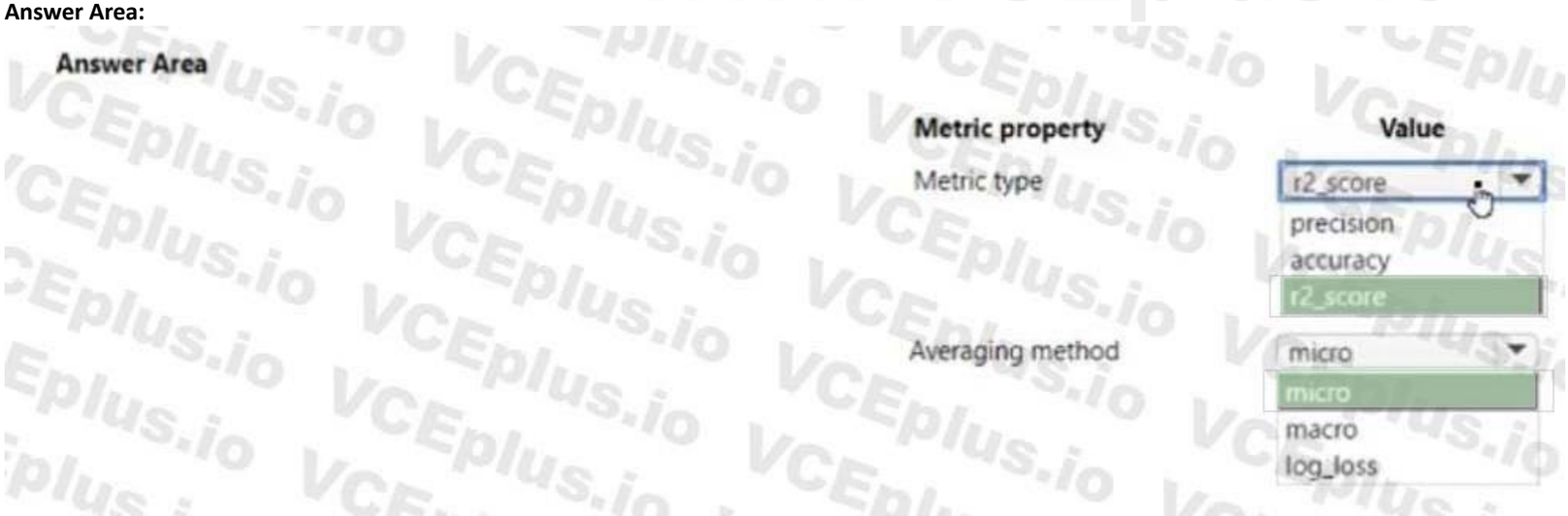
Section:
Explanation:

QUESTION 31

HOTSPOT
You create an Azure Machine Learning workspace. You train a classification model by using automated machine learning (automated ML) in Azure Machine Learning studio. The training data contains multiple classes that have significantly different numbers of samples.
You must use a metric type to avoid labeling negative samples as positive and an averaging method that will minimize the class imbalance.
You need to configure the metric type and the averaging method.
Which configurations should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area:



Section:
Explanation:

QUESTION 32
You create an Azure Machine Learning workspace named workspaces. You create a Python SDK v2 notebook to perform custom model training in wortcspacel. You need to run the notebook from Azure Machine

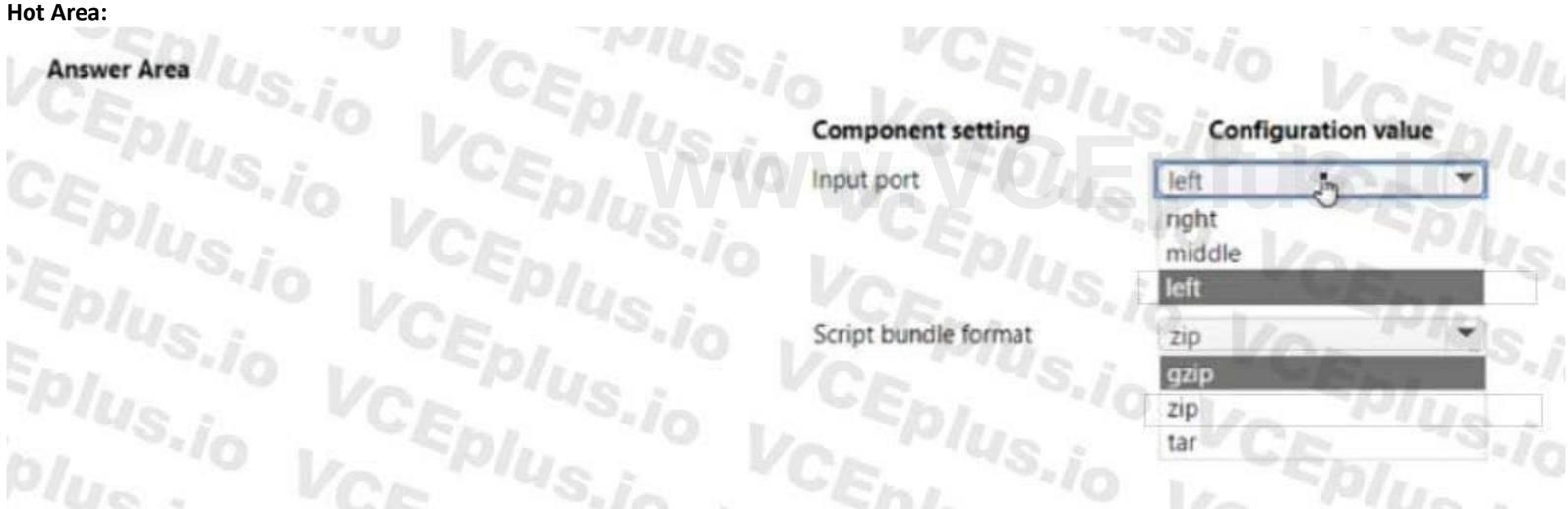
Learning Studio in workspace1. What should you provision first?

A. default storage account
B. real-time endpoint
C. Azure Machine Learning compute cluster
D. Azure Machine Learning compute instance

Correct Answer: D
Section:

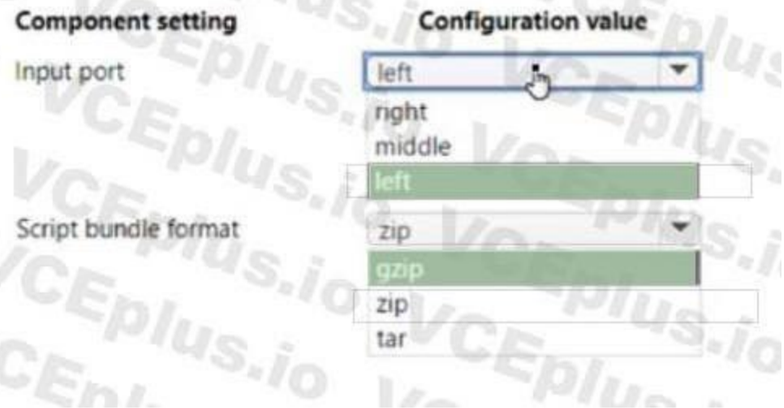
QUESTION 33
HOTSPOT
You create an Azure Machine Learning dataset. You use the Azure Machine Learning designer to transform the dataset by using an Execute Python Script component and custom code.
You must upload the script and associated libraries as a script bundle.
You need to configure the Execute Python Script component.
Which configurations should you use? To answer, select the appropriate options in the answer area.
NOTE Each correct selection is worth one point.

Hot Area:



Answer Area:

Answer Area



Section:
Explanation:

QUESTION 34
You are profiling mltabte data assets by using Azure Machine Learning studio. You need to detect columns with odd or missing values. Which statistic should you analyze?

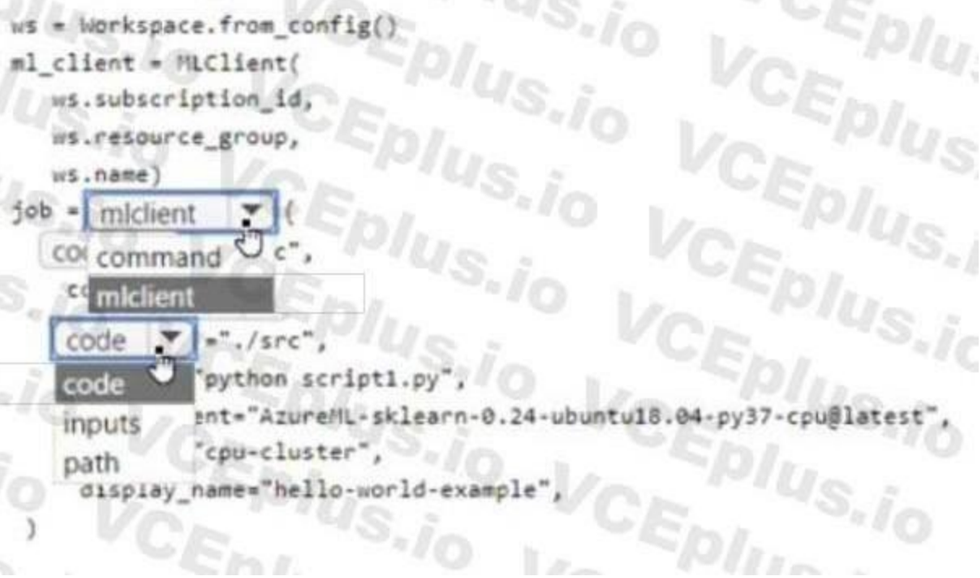
A. Profile
B. Std deviation
C. Error count
D. Type

Correct Answer: C
Section:

QUESTION 35
HOTSPOT
You create an Azure Machine learning workspace. The workspace contains a folder named src. The folder contains a Python script named script 1 .py.
You use the Azure Machine Learning Python SDK v2 to create a control script. You must use the control script to run script l.py as part of a training job.
You need to complete the section of script that defines the job parameters.
How should you complete the script? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

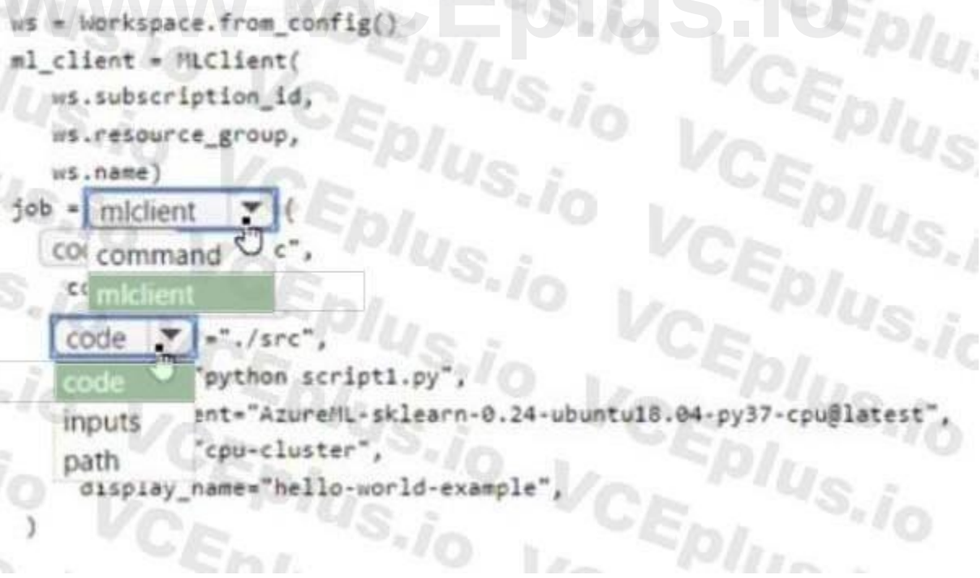
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:
Explanation:

Answer Area

```
ws = Workspace.from_config()
ml_client = MLClient(
    ws.subscription_id,
    ws.resource_group,
    ws.name)
job = [mlclient] (
  [code] ="./src",
    command="python script1.py",
    environment="AzureML-sklearn-0.24-ubuntu18.04-py37-cpu@latest",
    compute="cpu-cluster",
    display_name="hello-world-example",
)
```

QUESTION 36
HOTSPOT
You create an Azure Machine Learning workspace.
You must use the Python SDK v2 to implement an experiment from a Jupyter notebook in the workspace. The experiment must log a table in the following format:

```
table = {
    "col1" : [1, 2, 3],
    "col2" : [4, 5, 6]
}
```

You need to complete the Python code to log the table.
How should you complete the code? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

Answer Area:

Answer Area

Section:
Explanation:

QUESTION 37
HOTSPOT
You manage an Azure Machine Learning workspace. You create an experiment named experiment1 by using the Azure Machine Learning Python SDK v2 and MLflow.

```
runs = mlflow.search_runs(
    experiment_names=["experiment1"],
    max_results=5,
    order_by=["start_time ASC"])

runs[runs.status == "FAILED"]
```

For each of the following statements, select Yes if the statement rs true. Otherwise, select No.

Hot Area:

Answer Area

Statements	Yes	No
Aborted runs are returned.	○	○
The latest five experiment runs are returned.	○	○
The jobs that are returned have been canceled or killed by the user or system.	○	○
All metrics and their values are returned for the returned experiment runs.	○	○

Answer Area:

Answer Area

Statements	Yes	No
Aborted runs are returned.	○	○
The latest five experiment runs are returned.	○	○
The jobs that are returned have been canceled or killed by the user or system.	○	○
All metrics and their values are returned for the returned experiment runs.	○	○

Section:
Explanation:

QUESTION 38
You manage an Azure Machine Learning workspace. You have an environment for training jobs which uses an existing Docker image. A new version of the Docker image is available. You need to use the latest version of the Docker image for the environment configuration by using the Azure Machine Learning SDK v2-What should you do?

A. Modify the conda.file to specify the new version of the Docker image.
B. Use the Environment class to create a new version of the environment.
C. Use the create.or.update method to change the tag of the image.
D. Change the description parameter of the environment configuration.

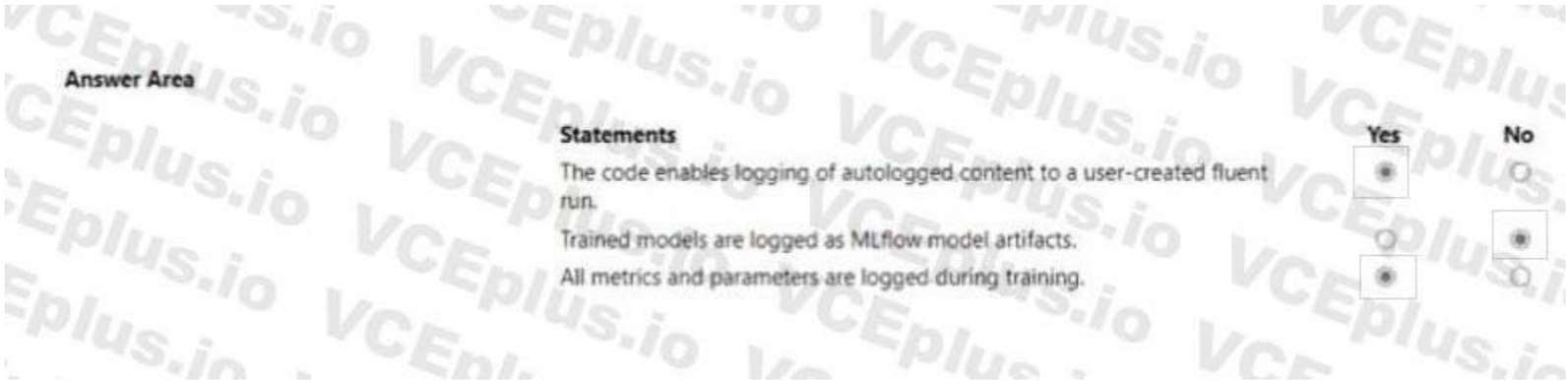
Correct Answer: A
Section:

QUESTION 39
HOTSPOT
You manage an Azure Machine Learning workspace. You submit a training job with the Azure Machine Learning Python SDK v2. You must use MLflow to log metrics, model parameters, and mode! artifacts automatically when training a model.
You start by writing the following code segment:

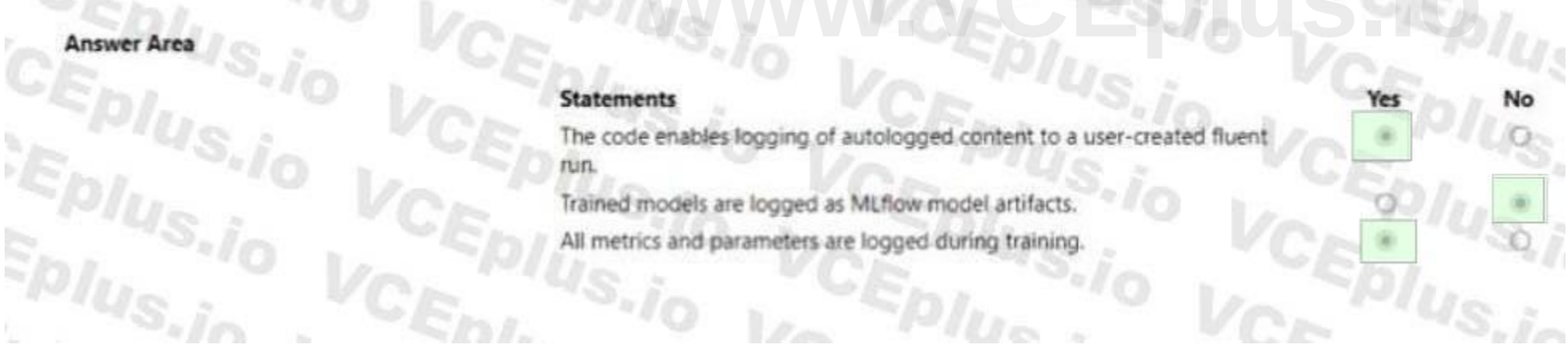
```
import mlflow
mlflow.autolog(log_models=False, exclusive=True)
```

For each of the following statements, select Yes If the statement is true. Otherwise, select No.

Hot Area:



Answer Area:



Section:
Explanation:

QUESTION 40
You create an Azure Machine Learning workspace.
You must configure an event handler to send an email notification wten data drift is detected in the workspace datasets. You must minimize development efforts.
You need to configure an Azure service to send the notification.
Which Azure service should you use?

A. Azure Function apps
B. Azure DevOps pipeline
C. Azure Automation runbook

D. Azure Logic Apps

Correct Answer: D
Section:

QUESTION 41
You are using Azure Machine Learning to monitor a trained and deployed model. You implement Event Grid to respond to Azure Machine Learning events.
Model performance has degraded due to model input data changes.
You need to trigger a remediation ML pipeline based on an Azure Machine Learning event.
Which event should you use?

A. RunStatusChanged
B. DatasetDriftDetected
C. ModelDeployed
D. RunCompleted

Correct Answer: B
Section:

QUESTION 42
You have an Azure Machine Learning workspace. You build a deep learning model.
You need to publish a GPU-enabled model as a web service.
Which two compute targets can you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. Azure Kubernetes Service (AKS)
B. Azure Container Instances (ACI)
C. Local web service
D. Azure Machine Learning compute clusters

Correct Answer: A, B
Section:

QUESTION 43
You train and register an Azure Machine Learning model
You plan to deploy the model to an online endpoint
You need to ensure that applications will be able to use the authentication method with a nonexpiring artifact to access the model.
Solution:
Create a managed online endpoint and set the value of its auth.mode parameter to aml.token.
Deploy the model to the online endpoint.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B

Section:

QUESTION 44
You train and register an Azure Machine Learning model
You plan to deploy the model to an online endpoint
You need to ensure that applications will be able to use the authentication method with a nonexpiring artifact to access the model.
Solution:
Create a managed online endpoint with the default authentication settings. Deploy the model to the online endpoint.
Does the solution meet the goal?

A. Yes
B. No

Correct Answer: B
Section:
Explanation:

QUESTION 45
You build a data pipeline in an Azure Machine Learning workspace by using the Azure Machine Learning SDK for Python.
You need to run a Python script as a pipeline step.
Which two classes could you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. PythonScriptStep
B. AutoMLStep
C. CommandStep
D. StepRun

Correct Answer: A, C
Section:

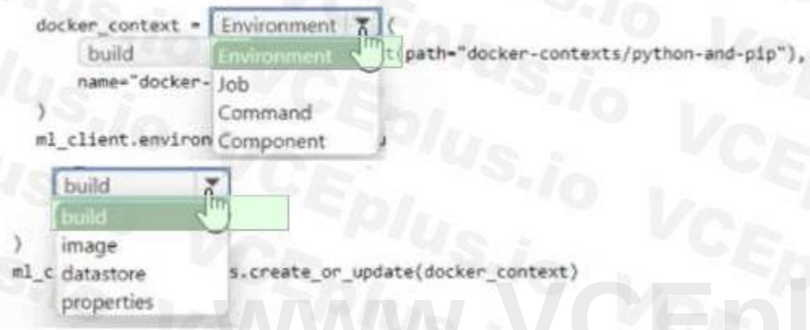
QUESTION 46
HOTSPOT
You manage an Azure Machine Learning workspace.
You must define the execution environments for your jobs and encapsulate the dependencies for your code.
You need to configure the environment from a Docker build context.
How should you complete the rode segment? To answer, select the appropriate option in the answer area.
NOTE: Each correct selection is worth one point.
Answer:

Hot Area:

Answer Area

Answer Area:

Answer Area



Section:
Explanation:

Answer Area

QUESTION 47
You have a dataset that contains records of patients tested for diabetes. The datasei includes the patient s age.
You plan to create an analysis that will report the mean age value from the differentially private data derived from the dataset-
You need to identify the epsilon value to use in the analysis that minimizes the risk of exposing the actual data.
Which epsilon value should you use?

A. -1.5
B. -0.5
C. 0.5
D. 1.5

Correct Answer: D
Section:

QUESTION 48
You create a binary classification model. You use the Fairlearn package to assess model fairness. You must eliminate the need to retrain the model. You need to implement the Fair learn package. Which algorithm should you use?

A. fairlearn.reductions.ExponentiatedGradient
B. fatrlearn.reductions.GridSearch
C. fair Icarn.postprocessing.ThresholdOplimizer
D. fairlearn.preprocessing.CorrelationRemover

Correct Answer: D
Section:

QUESTION 49
HOTSPOT
You manage an Azure Machine Learning workspace. You configure an automated machine learning regression training job by using the Azure Machine Learning Python SDK v2. You configure the regression job by using the following script:

```
regression_job.set_limits(
    timeout_minutes = 60,
    max_concurrent_trials = 5,
    enable_early_termination = True
)
```

For each of the following statements, select Yes if the statement is true. Otherwise, select No.

Hot Area:
Answer Area

Statements	Yes	No
The job is terminated if the score is not improving in a specific number of iterations.	○	○
A maximum of five AutoML trials are run in parallel during the regression job.	○	○
One AutoML trial can run for 60 minutes before it is terminated.	○	○
The AutoML trial run can take up to 1 month before it terminates.	○	○

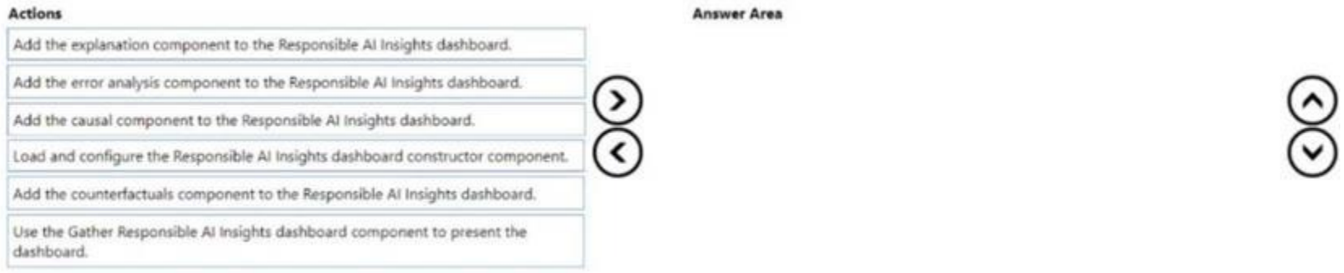
Answer Area:
Answer Area

Statements	Yes	No
The job is terminated if the score is not improving in a specific number of iterations.	○	○
A maximum of five AutoML trials are run in parallel during the regression job.	○	○
One AutoML trial can run for 60 minutes before it is terminated.	○	○
The AutoML trial run can take up to 1 month before it terminates.	○	○

Section:
Explanation:

QUESTION 50
DRAG DROP
You manage an Azure Machine Learning workspace. You train a model named model1.
You must identify the features to modify for a differing model prediction result.
You need to configure the Responsible Al (RAI) dashboard for model1.
Which three actions should you perform in sequence? To answer move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:

Section:
Explanation:

QUESTION 51
You have an Azure Machine Learning (ML) model deployed to an online endpoint.
You need to review container logs from the endpoint by using Azure Ml Python SDK v2. The logs must include the console log from the inference server with print/log statements from the models scoring script.
What should you do first?

A. Create an instance of the the MLClient class.
B. Create an instance of the OnlineDeploymentOperations class.
C. Connect by using SSH to the inference server.
D. Connect by using Docker tools to the inference server.

Correct Answer: A
Section:

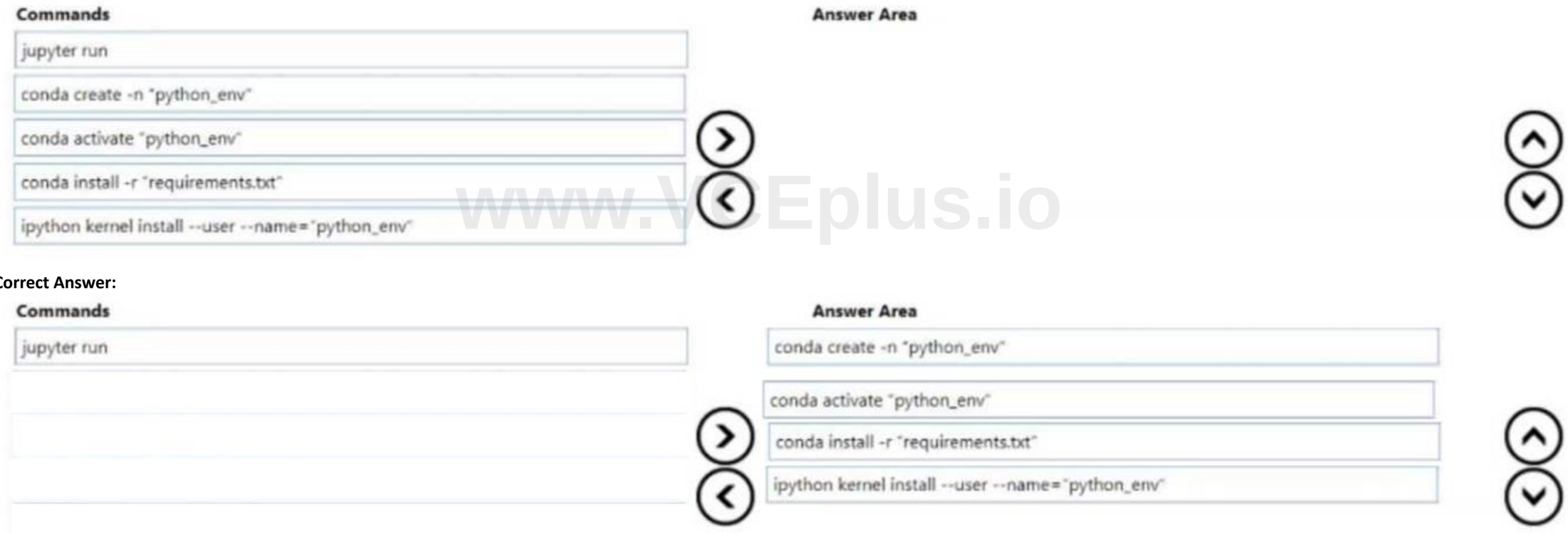
QUESTION 52
You train and publish a machine teaming model.
You need to run a pipeline that retrains the model based on a trigger from an external system.
What should you configure?

A. Azure Data Catalog
B. Azure Batch
C. Azure logic App

Correct Answer: C
Section:

QUESTION 53
DRAG DROP
You manage an Azure Machine Learning workspace named workspace1 with a compute instance named compute1. You connect to compute! by using a terminal window from wofkspace1. You create a file named "requirements.txt" containing Python dependencies to include Jupyler.
You need to add a new Jupyter kernel to compute1.
Which four commands should you use? To answer, move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:



Correct Answer:

Section:
Explanation:

QUESTION 54
You create a workspace to include a compute instance by using Azure Machine Learning Studio. You are developing a Python SDK v2 notebook in the workspace. You need to use Intellisense in the notebook. What should you do?

A. Start the compute instance.
B. Run a %pip magic function on the compute instance.
C. Run a !pip magic function on the compute instance.
D. Stop the compute instance.

Correct Answer: B
Section:

QUESTION 55
HOTSPOT
You use Azure Machine Learning to train a machine learning model.
You use the following training script in Python to perform logging:

```
import mlflow
mlflow.log_metric("accuracy", float(val_accuracy))
```

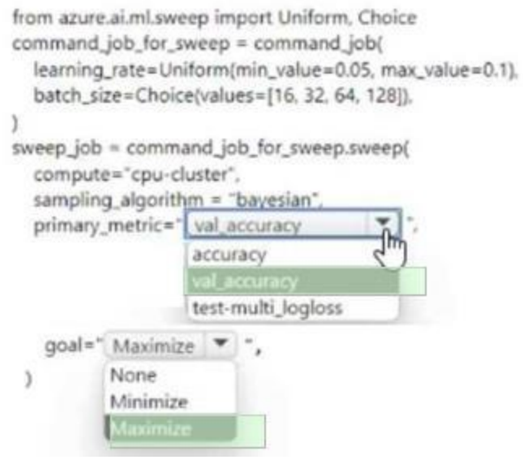
You must use a Python script to define a sweep job.
You need to provide the primary metric and goal you want hyperparameter tuning to optimize.
NOTE: Each correct selection is worth one point.

Hot Area:

Answer Area

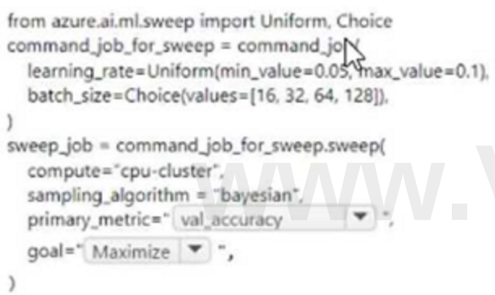
Answer Area:

Answer Area



Section:
Explanation:

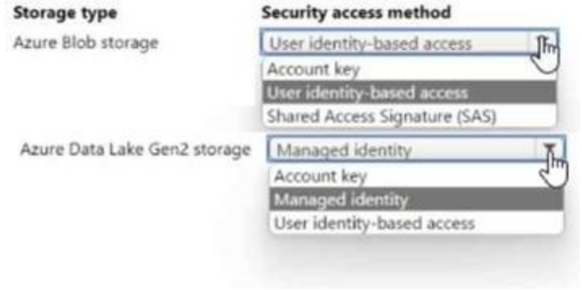
Answer Area



QUESTION 56
HOTSPOT
You manage an Azure Machine Learning workspace named workspacel by using the Python SDK v2.
You must register datastores in workspacel for Azure Blob and Azure Data Lake Gen2 storage to meet the following requirements:
• Data scientists accessing the datastore must have the same level of access.
• Access must be restricted to specified containers or folders.
You need to configure a security access method used to register the Azure Blob and Azure Data lake Gen? storage in workspacel. Which security access method should you configure? To answer, select the appropriate options in the answcf area.
NOTE: Each correct selection is worth one point.

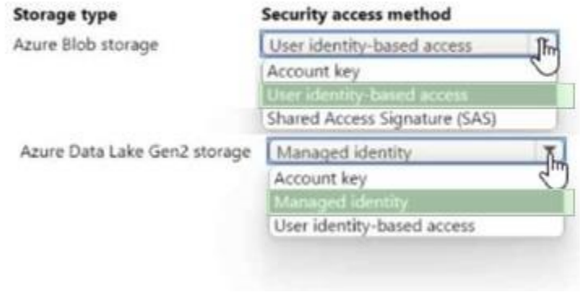
Hot Area:

Answer Area



Answer Area:

Answer Area

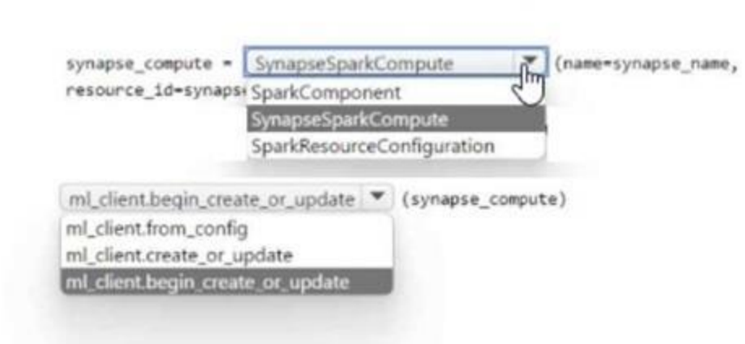


Section:
Explanation:

QUESTION 57
HOTSPOT
You are creating data wrangling and model training solutions in an Azure Machine Learning workspace.
You must use the same Python notebook to perform both data wrangling and model training.
You need to use the Azure Machine Learning Python SDK v2 to define and configure the Synapse Spark pool asynchronously in the workspace as dedicated compute
How should you complete the rode segment? To answer, select the appropriate options in the answer area.
NOTE: Lach correct selection is worth one point.

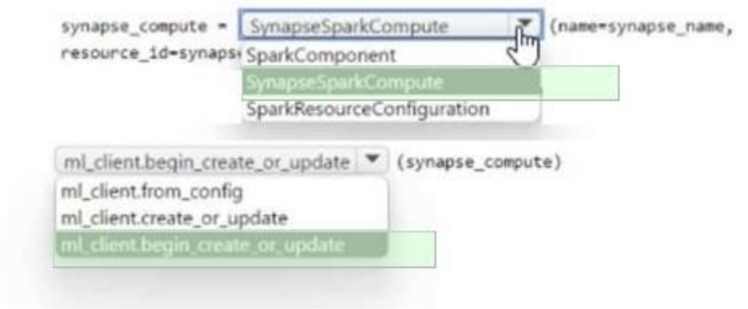
Hot Area:

Answer Area



Answer Area:

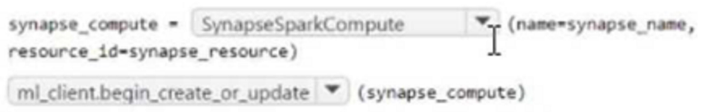
Answer Area



Section:

Explanation:

Answer Area



QUESTION 58

DRAG DROP

You create an Azure Machine Learning workspace and an Azure Synapse Analytics workspace with a Spark pool. The workspaces are contained within the same Azure subscription.

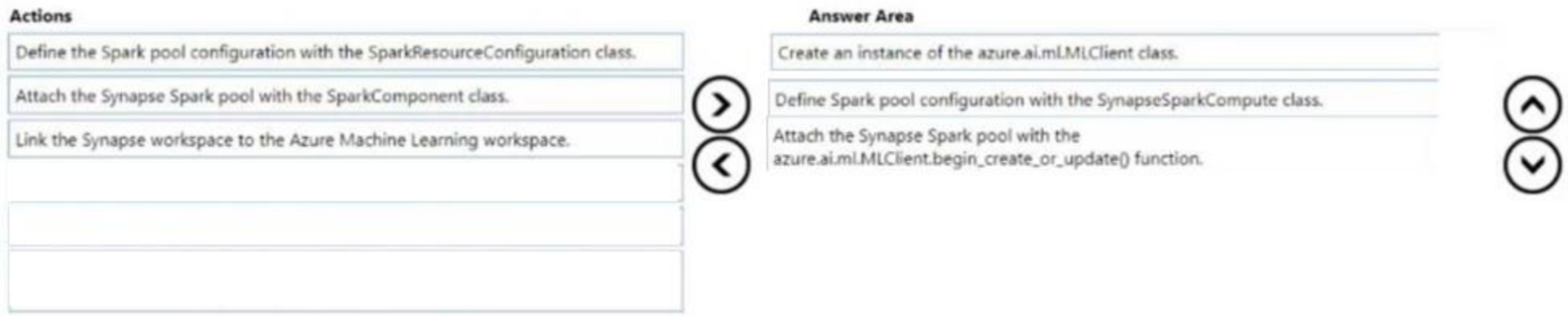
You must manage the Synapse Spark pool from the Azure Machine Learning workspace.

You need to attach the Synapse Spark pool in Azure Machine Learning by usinq the Python SDK v2.

Which three actions should you perform in sequence? To answer move the appropriate actions from the list of actions to the answer area and arrange them in the correct order.

Select and Place:

Correct Answer:



Section:
Explanation:

QUESTION 59
HOTSPOT
You are using hyperparameter tuning in Azure Machine Learning Python SDK v2 to train a model. You configure the hyperparameter tuning experiment by running the following code:

```
from azure.ai.ml.sweep import Normal, Uniform

command_job_for_sweep = command_job(
    learning_rate=Normal(10, 3),
    keep_probability=Uniform(0.05, 0.1),
    batch_size=Choice(values=[16, 32, 64, 128]),
    number_of_hidden_layers=Choice(range(3,5))
)
```

For each of the following statements select Yes if the statement is true. Otherwise, select No. NOTE:
Fach correct selection is worth one paint.

Hot Area:
Answer Area

Statements	Yes	No
By defining sampling in this manner, every possible combination of the parameters will be tested.	○	○
Random values of the learning_rate parameter will be selected from a normal distribution with a mean of 10 and a standard deviation of 3.	○	○
The keep_probability parameter value will always be either **0.05** or **0.1**.	○	○
Random values for the number_of_hidden_layers parameter will be selected from a normal distribution with a mean of 3 and a standard deviation of 5.	○	○

Answer Area:

Answer Area

Statements	Yes	No
By defining sampling in this manner, every possible combination of the parameters will be tested.	○	○
Random values of the learning_rate parameter will be selected from a normal distribution with a mean of 10 and a standard deviation of 3.	○	○
The keep_probability parameter value will always be either **0.05** or **0.1**.	○	○
Random values for the number_of_hidden_layers parameter will be selected from a normal distribution with a mean of 3 and a standard deviation of 5.	○	○

Section:
Explanation:

QUESTION 60
You have an Azure Machine Learning workspace. You are connecting an Azure Data Lake Storage Gen2 account to the workspace as a data store. You need to authorize access from the workspace to the Azure Data Lake Storage Gen2 account.
What should you use?

A. Managed identity
B. SAS token
C. Service principal
D. Account key

Correct Answer: C
Section:

QUESTION 61
You create a workspace by using Azure Machine Learning Studio.
You must run a Python SDK v2 notebook in the workspace by using Azure Machine Learning Studio.
You need to reset the state of the notebook.
Which three actions should you use? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

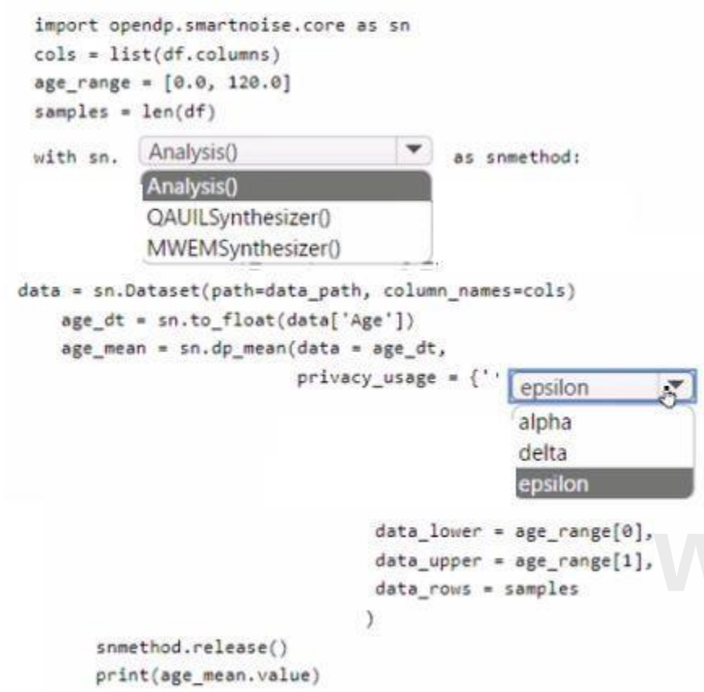
A. Reset the compute.
B. Change the current kernel.
C. Stop the current kernel.
D. Change the compute.
E. Navigate to another section of the workspace.

Correct Answer: A, B, D
Section:

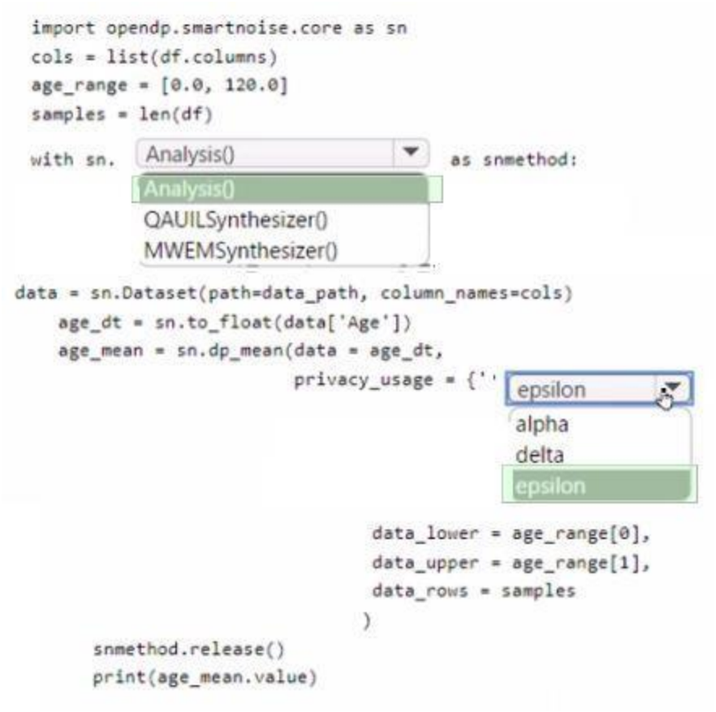
QUESTION 62
HOTSPOT
You load data from a notebook in an Azure Machine Learning workspace into a pandas dataframe named df. The data contains 10.000 patient records. Each record includes the Age property for the corresponding

patient.
You must identify the mean age value from the differentially private data generated by SmartNoise SDK.
You need to complete the Python code that will generate the mean age value from the differentially private data.
Which code segments should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

Hot Area:



Answer Area:

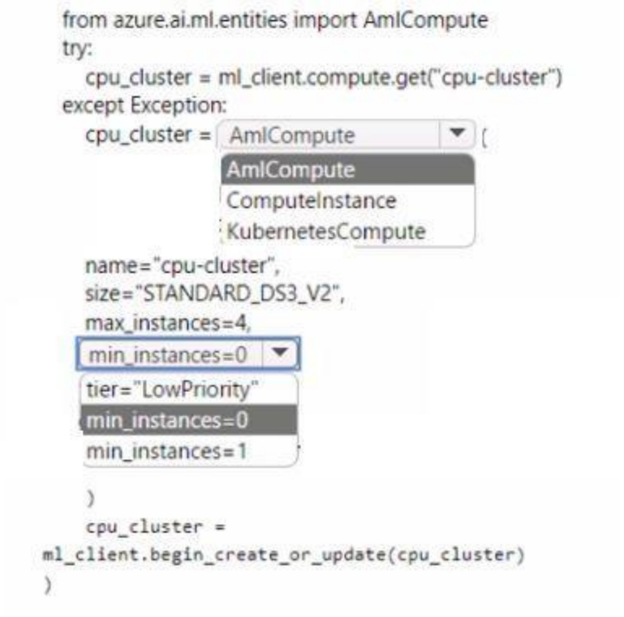


Section:
Explanation:

QUESTION 63
HOTSPOT
You create an Azure Machine Learning workspace. You use the Azure Machine Learning Python SDK v2 to create a compute cluster.
The compute cluster must run a training script. Costs associated with running the training script must be minimized.
You need to complete the Python script to create the compute cluster.
How should you complete the script? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

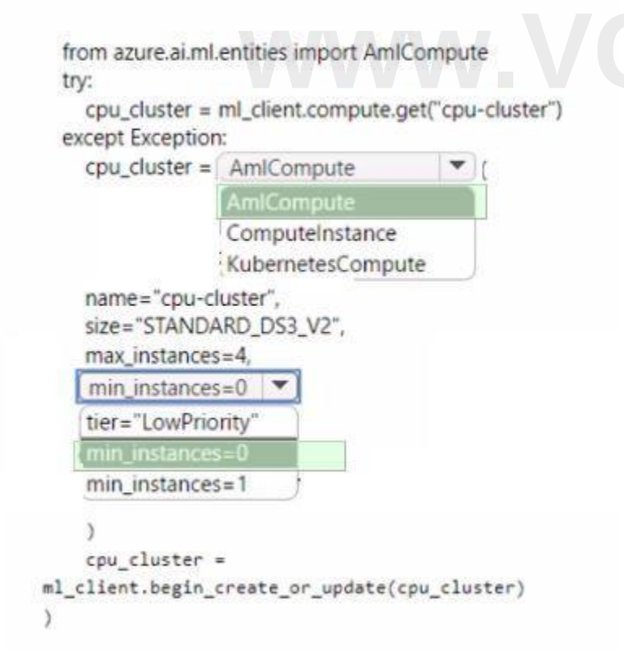
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:
Explanation:

QUESTION 64

Note: This question is part of a series of questions that present the same scenario. Each question in the series contains a unique solution that might meet the stated goals. Some question sets might have more than one correct solution, while others might not have a correct solution.
After you answer a question in this section, you will NOT be able to return to it. As a result, these questions will not appear in the review screen.
You train and register an Azure Machine Learning model.
You plan to deploy the model to an online endpoint.
You need to ensure that applications will be able to use the authentication method with a non-expiring artifact to access the model.
Solution:
Create a managed online endpoint and set the value of its auto_mode parameter to key. Deploy the model to the inline endpoint.
Does the solution meet the goal?

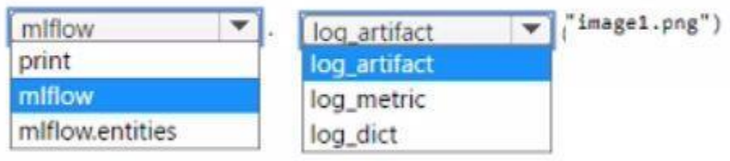
A. Yes
B. No

Correct Answer: A
Section:

QUESTION 65
HOTSPOT
You create an Azure Machine Learning workspace.
You plan to write an Azure Machine Learning SDK for Python v2 script that logs an image for an experiment. The logged image must be available from the images tab in Azure Machine Learning Studio.
You need to complete the script.
Which code segments should you use? To answer, select the appropriate options in the answer area.
NOTE: Each correct selection is worth one point.

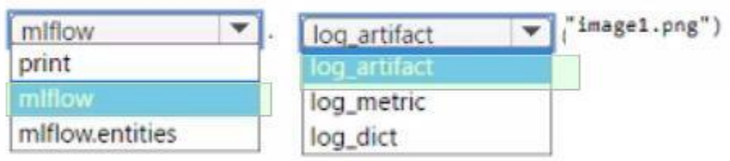
Hot Area:

Answer Area



Answer Area:

Answer Area



Section:
Explanation:

QUESTION 66

You manage an Azure Machine Learning workspace.
You must log multiple metrics by using MLflow.
You need to maximize logging performance.
What are two possible ways to achieve this goal? Each correct answer presents a complete solution.
NOTE: Each correct selection is worth one point.

A. MLflowClient.log_batch
B. mlflowlog_metrics
C. mlflow.log_param
D. mlflow.log. metric

Correct Answer: A, B
Section:

QUESTION 67
You manage an Azure Machine Learning workspace.
You need to define an environment from a Docker image by using the Azure Machine Learning Python SDK v2.
Which parameter should you use?

A. conda_file
B. image
C. build
D. properties

Correct Answer: B
Section:

QUESTION 68
You use Azure Machine Learning studio to analyze an mltable data asset containing a decimal column named column1. You need to verify that the column1 values are normally distributed.
Which statistic should you use?

A. Max
B. Type
C. Profile
D. Mean

Correct Answer: C
Section: