Question 1
L2QM-BS0005-1908
LOS: LOS-6023
Lesson Reference: Lesson 2: Machine Learning Algorithms
Difficulty: medium
An analyst has access to historical data consisting of 19 fundamental and 5 technical factors for several thousand high-yield bond issuers and issues labeled to indicate default or no default. She wants to develop an ML-based model that will make accurate classifications in two categories: default and no default. Exploratory data analysis suggests considerable nonlinearities among the feature set. Which of the following ML algorithms is *most appropriate* in this situation?

- (●) Classification and Regression Tree
- ( ) Support Vector Machine
- ( ) K-nearest neighbor

Rationale
✔ **Classification and Regression Tree**
Correct. With such a large feature set and significant nonlinearities among the feature set, CART is the most appropriate ML algorithm to apply in this case.

Rationale
✘ **Support Vector Machine**
This choice is incorrect.

Rationale
✘ **K-nearest neighbor**
This choice is incorrect.

Question 2
L2QM-BS0006-1908
LOS: LOS-6024
Lesson Reference: Lesson 2: Machine Learning Algorithms
Difficulty: medium
An analyst wants to use ML techniques to divide 5,000 stocks into 15 different groups, based on a wide variety of the relevant financial and non-financial characteristics. The aim is to prevent unintended portfolio concentration by selecting stocks from different groups. Which of the following ML techniques is *most appropriate* in this situation?

- (●) K-means clustering
- ( ) Principal component analysis
- ( ) Classification and Regression Trees

Rationale
✔ **K-means clustering**
Correct. K-Means clustering is an unsupervised machine learning algorithm that repeatedly partitions observations into a fixed number, k, of non-overlapping clusters (i.e., groups).

Rationale
✘ **Principal component analysis**
Incorrect. Principal component analysis is a long-established statistical method for dimension reduction, not clustering.

Rationale
✘ **Classification and Regression Trees**
Incorrect. CART is a supervised machine learning technique that is most commonly applied to binary classification or regression.

Question 3
L2QM-BS0003-1908
LOS: LOS-6022
Lesson Reference: Lesson 1: What is Machine Learning?
Difficulty: medium
A model that is good at correctly classifying using the training sample, but does not perform well using new data, is *most likely* impaired by:

- Underfitting and bias error.
- Overfitting and bias error.
- Overfitting and variance error.

Rationale
Underfitting and bias error.
This choice is incorrect.

Rationale
Overfitting and bias error.
This choice is incorrect.

Rationale
Overfitting and variance error.
Correct. A model that fits the training sample well but does not perform well out of sample has most likely fit the training sample too well (overfitting), which gives rise to high variance error when applied to out-of-sample data.

Question 4
L2QM-BS0001-1908
LOS: LOS-6021
Lesson Reference: Lesson 1: What is Machine Learning?
Difficulty: medium

Consider the following statements:

Statement 1: Supervised ML involves training on labeled data to infer a pattern-based prediction rule.

Statement 2: Dimension reduction focuses on reducing the number of features in a data set while retaining variation across observations to preserve the information in that variation.

Which of the following is *most likely*?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are correct.

Rationale
Only Statement 1 is correct.
This choice is incorrect.

Rationale
Only Statement 2 is correct.
This choice is incorrect.

Rationale
Both statements are correct.
Correct. Both statements are correct by definition.

Question 5
L2QM-BS0002-1908
LOS: LOS-6021
Lesson Reference: Lesson 1: What is Machine Learning?
Difficulty: medium
Which of the following statements is *least* accurate? When attempting to discover relationships with a specific target variable:

- (●) An unsupervised ML algorithm is used.
- ( ) An ML algorithm that is given labeled training data is used.
- ( ) A supervised ML algorithm is used.

Rationale
✔ **An unsupervised ML algorithm is used.**
Correct. This is an inaccurate statement.

Rationale
✘ **An ML algorithm that is given labeled training data is used.**
Incorrect. This is a true statement because providing labeled training data means that the target is provided.

Rationale
✘ **A supervised ML algorithm is used.**
Incorrect. This is a true statement because a supervised ML algorithm is used to predict a target (Y) variable.

Question 6
L2QM-BS0004-1908
LOS: LOS-6023
Lesson Reference: Lesson 2: Machine Learning Algorithms
Difficulty: medium
An analyst wants to apply machine learning to determine the credit rating (investment-grade versus non-investment-grade) of an unrated bond issue using the company's profitability, cash flow, leverage, and coverage ratios. This is *most likely* an example of a(n):

- (●) Supervised learning classification problem.
- ( ) Unsupervised learning classification problem.
- ( ) Supervised learning regression problem.

Rationale
✔ **Supervised learning classification problem.**
Correct. The analyst is addressing a supervised learning classification problem because she must determine whether the company's bonds would be classified as investment-grade or non-investment-grade.

Rationale
✘ **Unsupervised learning classification problem.**
This choice is incorrect.

Rationale
✘ **Supervised learning regression problem.**
This choice is incorrect.

Question 7
L2QM-BS0007-1908
LOS: LOS-6025
Lesson Reference: Lesson 2: Machine Learning Algorithms
Difficulty: medium
Which of the following features of a neural network (NN) increases or decreases the strength of the total net input before passing it on to the next layer?

- Summation operator
- Activation function
- Eigenvector

Rationale
Summation operator
Incorrect. The summation operator receives input values, multiplies each by a weight, sums up the weighted values into the total net input, and passes it to the activation function.

Rationale
Activation function
Correct. The activation function in a node operates like a light dimmer switch since it decreases or increases the strength of the total net input.

Rationale
Eigenvector
Incorrect. Eigenvectors are simply mutually uncorrelated composite variables formed in principal component analysis (PCA).