**Module 8 and 9**

1. Correlation:

a) Which of the following correlation coefficients indicates the strongest linear relationship between two variables?

i) 0.2

**ii) -0.8**

iii) 0

iv) 0.6

b) If the correlation coefficient between two variables is -0.9, what does this indicate about their relationship?

i) Strong positive correlation

ii) No correlation

**iii) Strong negative correlation**

iv) Weak negative correlation

2. Basics of Regression Models:

a) What is the primary goal of regression analysis?

i) To predict categorical outcomes

**ii) To predict continuous outcomes**

iii) To classify data points into clusters

iv) To analyze variance in a dataset

b) In simple linear regression, how many independent variables are used to predict the dependent variable?

**i) One**

ii) Two

iii) Three

iv) It depends on the dataset

3. Ordinary Least Squares (OLS):

a) What is the main principle behind Ordinary Least Squares regression?

**i) Minimizing the sum of squared errors**

ii) Maximizing the sum of squared errors

iii) Minimizing the sum of absolute errors

iv) Maximizing the sum of absolute errors

b) What does the intercept term represent in the OLS regression equation?

i) The slope of the regression line

**ii) The value of the dependent variable when all independent variables are zero**

iii) The average value of the independent variable

iv) The variance of the residuals

4. Simple Linear Regression:

a) In simple linear regression, what is the role of the independent variable?

i) It is the variable being predicted

**ii) It is the variable being predicted from**

iii) It is the variable being controlled

iv) It is not used in simple linear regression

b) How is the best-fit line determined in simple linear regression?

**i) By minimizing the sum of squared residuals**

ii) By maximizing the sum of squared residuals

iii) By minimizing the correlation coefficient

iv) By maximizing the correlation coefficient

5. Random Forests:

a) What is a key characteristic of random forests?

i) They consist of a single decision tree

ii) They rely on boosting techniques

**iii) They are an ensemble learning method**

iv) They are a type of unsupervised learning algorithm

b) How does a random forest model prevent overfitting?

i) By using a single decision tree

**ii) By averaging predictions from multiple decision trees**

iii) By increasing the complexity of each decision tree

iv) By decreasing the number of decision trees in the forest

6. Model Diagnostics:

a) What is a residual plot used for in regression analysis?

i) To visualize the relationship between independent and dependent variables

**ii) To identify outliers and patterns in the residuals**

iii) To determine the correlation coefficient

iv) To assess multicollinearity among independent variables

b) In regression analysis, what does it mean if the residuals are normally distributed?

i) The model is biased

**ii) The model is unbiased**

iii) The model is overfit

iv) The model is underfit

7. Logistic Regression:

a) What type of outcome variable does logistic regression predict?

i) Continuous

**ii) Categorical**

iii) Ordinal

iv) Nominal

b) How is the logistic function used in logistic regression?

**i) To calculate probabilities of class membership**

ii) To calculate mean squared error

iii) To calculate the slope of the regression line

iv) To calculate the intercept of the regression line

8. K Nearest Neighbors (KNN):

a) What does the 'K' represent in K Nearest Neighbors algorithm?

i) The number of clusters

**ii) The number of nearest neighbors to consider**

iii) The number of features

iv) The number of iterations

b) How does KNN classify a new data point?

i) By calculating the average of its nearest neighbors

**ii) By assigning it to the most common class among its nearest neighbors**

iii) By using gradient descent

iv) By minimizing the Euclidean distance between data points

9. K-Means Clustering:

a) What is the objective of K-Means clustering?

**i) To maximize intra-cluster similarity and minimize inter-cluster similarity**

ii) To maximize inter-cluster similarity and minimize intra-cluster similarity

iii) To minimize the number of clusters

iv) To maximize the number of clusters

b) How is the initial centroid position chosen in K-Means clustering?

**i) Randomly**

ii) Based on the mean of all data points

iii) Based on the median of all data points

iv) Based on the mode of all data points

10. PCA (Principal Component Analysis):

a) What is the main goal of PCA?

**i) To reduce the dimensionality of the data**

ii) To increase the dimensionality of the data

iii) To classify data points into clusters

iv) To maximize the variance in the data

b) How are principal components determined in PCA?

**i) By maximizing the covariance between variables**

ii) By minimizing the covariance between variables

iii) By using gradient descent

iv) By randomly selecting variables

**Module-14**

1. Padding:

a) What is the purpose of padding in convolutional neural networks?

i) To reduce the size of feature maps

**ii) To increase the size of feature maps**

iii) To speed up the training process

iv) To decrease the number of parameters in the network

b) Which type of padding adds zeros around the input image or feature map?

i) Same padding

ii) Valid padding

iii) Full padding

**iv) Zero padding**

2. Strided Convolutions:

a) What does the stride of a convolutional layer determine?

i) The size of the filter/kernel

ii) The number of filters/kernels

**iii) The step size of the filter/kernel**

iv) The activation function used

b) How does increasing the stride in a convolutional layer affect the output size?

i) Increases the output size

**ii) Decreases the output size**

iii) Has no effect on the output size

iv) Depends on the padding used

3. Convolutions Over Volume:

a) In a convolutional neural network, what does the depth of a filter/kernel represent?

i) The size of the filter

ii) The number of filters

**iii) The number of input channels**

iv) The number of output channels

b) How are convolutions applied over volume in a CNN?

i) By using 3D filters/kernels

**ii) By applying 2D filters/kernels independently to each channel**

iii) By summing the convolutions across channels

iv) By using pooling layers

4. One Layer of a Convolutional Network:

a) In a convolutional layer, what is the purpose of the activation function?

i) To normalize the output values

**ii) To introduce non-linearity**

iii) To reduce the dimensionality of the input

iv) To increase the interpretability of the model

b) What are the learnable parameters in a convolutional layer?

**i) Filter/kernel weights and biases**

ii) Activation function parameters

iii) Input data

iv) Output feature maps

5. Simple Convolutional Network Example:

a) What is the typical architecture of a simple convolutional neural network?

**i) Multiple convolutional layers followed by pooling layers and fully connected layers**

ii) Only convolutional layers with no pooling layers

iii) Only pooling layers with no convolutional layers

iv) Only fully connected layers with no convolutional layers

b) What is the purpose of the final fully connected layers in a CNN?

i) To reduce the dimensionality of the output

ii) To increase the interpretability of the output

**iii) To make predictions based on the features learned by convolutional layers**

iv) To apply regularization to the model

6. Pooling Layers:

a) What is the main purpose of pooling layers in CNNs?

i) To increase the number of parameters in the network

**ii) To reduce the size of feature maps**

iii) To introduce non-linearity

iv) To increase the depth of feature maps

b) Which of the following pooling operations takes the maximum value from each window?

**i) Max pooling**

ii) Average pooling

iii) Global pooling

iv) Min pooling

7. CNN Example:

a) Which of the following tasks is typically performed using convolutional neural networks?

i) Time series forecasting

**ii) Image classification**

iii) Text generation

iv) Sentiment analysis

b) In a CNN architecture, what is the role of the feature extraction layers?

i) To preprocess the input data

**ii) To extract relevant features from the input data**

iii) To make final predictions

iv) To apply regularization to the model