Q1 Multiple regression is a broader class of regressions that encompasses linear and nonlinear regressions with multiple explanatory variables. Whereas linear regress only has one independent variable impacting the slope of the relationship, multiple regression incorporates multiple independent variables. A simple linear regression can accurately capture the relationship between two variables in simple relationships. On the other hand, multiple linear regression can capture more complex interactions that require more thought. A multiple regression model uses more than one independent variable.

Q2 Linearity: The relationship between the dependent and independent variables is linear. Independence: The observations are independent of each other. Homoscedasticity: The variance of the errors is constant across all levels of the independent variables. Normality: The errors follow a normal distribution. No multicollinearity: The independent variables are not highly correlated with each other. No endogeneity: There is no relationship between the errors and the independent variables.

Q3 The easiest way to understand and interpret slope and intercept in linear models is to first understand the slope-intercept formula: y = mx + b. M is the slope or the consistent change between x and y, and b is the y-intercept. Often, the y-intercept represents the starting point of the equation. The slope indicates the steepness of a line and the intercept indicates the location where it intersects an axis. The slope and the intercept define the linear relationship between two variables, and can be used to estimate an average rate of change.

Q4 Gradient Descent is an optimization algorithm for finding a local minimum of a differentiable function. Gradient descent in machine learning is simply used to find the values of a function's parameters (coefficients) that minimize a cost function as far as possible.Gradient-based learning is a type of machine learning in which the optimization algorithm uses gradients to update the model parameters during training. This approach is commonly used in deep learning and neural networks because it allows the model to learn complex representations of the input data.

Q5 Multiple linear regression is a regression model that estimates the relationship between a quantitative dependent variable and two or more independent variables using a straight line. Multiple linear regression refers to a statistical technique that uses two or more independent variables to predict the outcome of a dependent variable. The technique enables analysts to determine the variation of the model and the relative contribution of each independent variable in the total variance.

Q6 Multicollinearity exists whenever an independent variable is highly correlated with one or more of the other independent variables in a multiple regression equation. Multicollinearity is a problem because it will make the statistical inferences less reliable. 1.Multicollinearity can occur due to poorly designed experiments, highly observational data, creating new variables that are dependent on other variables, including identical variables in the dataset, inaccurate

use of dummy variables, or insufficient data. 2.One method to detect multicollinearity is to calculate the variance inflation factor (VIF) for each independent variable, and a VIF value greater than 1.5 indicates multicollinearity. 3.To fix multicollinearity, one can remove one of the highly correlated variables, combine them into a single variable, or use a dimensionality reduction technique such as principal component analysis to reduce the number of variables while retaining most of the information.

Q7 Polynomial regression is a kind of linear regression in which the relationship shared between the dependent and independent variables Y and X is modeled as the nth degree of the polynomial. This is done to look for the best way of drawing a line using data points.A polynomial regression model is a machine learning model that can capture non-linear relationships between variables by fitting a non-linear regression line, which may not be possible with simple linear regression. It is used when linear regression models may not adequately capture the complexity of the relationship.

Q8 A polynomial regression model is a machine learning model that can capture non-linear relationships between variables by fitting a non-linear regression line, which may not be possible with simple linear regression. It is used when linear regression models may not adequately capture the complexity of the relationship. This flexibility is helpful when the underlying relationship is curvilinear. Improved fit: By allowing for more flexible curve fitting, polynomial regression can often provide a better fit to the data compared to linear regression. This can help in finding the best-fitting curve among different options.