Time: 1:30hrs **Weekly Assessment** Marks:25 (5 for each)

1. Describe linear regression and its purpose.

   Introduce the concept of the linear relationship between the dependent variable (target) and one or more independent variables (features).

   State the linear regression equation: $y = \beta_0 + \beta_1 x + \epsilon$.

2. Explain the optimization algorithm used to minimize the cost function.

3. Define the cost function (Mean Squared Error, MSE): $J(\beta_0, \beta_1) = \frac{1}{n} \sum_{i=1}^{n} (y_i - (\beta_0 + \beta_1 x_i))^2$.

4. Describe the gradient descent update rules:

$$\beta_0 := \beta_0 - \alpha \frac{\partial J}{\partial \beta_0}$$

$$\beta_1 := \beta_1 - \alpha \frac{\partial J}{\partial \beta_1}$$

   Discuss the learning rate (α) and its impact on convergence.

5. Extend the linear regression model to include multiple independent variables.

   State the multiple linear regression equation: $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \epsilon$.