

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE 514 (CS 535) Machine Learning – Spring 2025
Quiz 4

Name: _____

Campus ID: _____

Total Marks: 10

Time Duration: 15 minutes

Question 1 (8 marks)

We consider a dataset with two features: study hours (x_1) and sleep hours (x_2), with the corresponding exam scores (y).

Study Hours (x_1)	Sleep Hours (x_2)	Exam Score (y)
5.0	10	75
6.0	12	78
6.5	13	85
7.0	14	88

- (a) [1 mark] Write a linear model for predicting y using both features.
- (b) [2 marks] Formulate the matrix equation $Y = X\theta$, clearly defining Y , X , and θ .
- (c) [1 mark] Write the least-squares objective function for estimating θ .
- (d) [4 marks] Now consider using only one feature (study hours, x_1). Rewrite the model and find the two parameters of the model.

Question 2 (2 marks)

- 1. How does high bias affect the performance of a machine-learning model?
 - a) It leads to poor performance on the training data but an excellent generalization.
 - b) It results in the model failing to capture the patterns in the data, causing poor performance on both training and test sets.
 - c) It increases the variance of the model, making it sensitive to small changes in data.
 - d) It reduces the number of parameters in the model, improving flexibility.
- 2. Which approach can help reduce high variance in a model?
 - a) Increasing the model complexity
 - b) Decreasing the amount of training data
 - c) Applying regularization techniques like L1 or L2
 - d) Reducing the number of features used for training