Assignment - I

Machine Learning

Year: 3 Semester: 6

Last date for Submission: 15th February 2025

Submission is only allowed during Theory Class Time

Late Submissions will not be accepted

February 1, 2025

Submission Instruction: Write the assignment only on A4-sized pages. At the top of the first page, clearly mention your Name, Section, Section Serial Number, Enrollment Number, and Registration Number.

Answer all the questions from the following:

1. Consider a logistic regression model with the feature vector $x = [1, 4, 2]$ and the true label $y = 1$. The model parameters are $\theta = [0.5, -0.3, 0.8]$, and the regularization parameter $\lambda = 0.5$. Calculate the cost function for logistic regression with L2 regularization.

2. Given a polynomial regression model $h_\theta(x) = \theta_0 + \theta_1 x + \theta_2 x^2$, with the true label $y = 25$, and the feature vector $x = 3$, calculate the cost function with L2 regularization. The parameters are $\theta = [2, 3, -1]$, and the regularization parameter $\lambda = 0.4$.

3. Consider a linear regression model $h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3$ with initial parameters $\theta_0 = 1$, $\theta_1 = 0.3$, $\theta_2 = -0.5$, and $\theta_3 = 0.8$ and regularization parameter $\lambda = 0.2$. Given the training example $(x_1, x_2, x_3, y) = (2, -1, 4, 7)$, update the parameters $\theta_0, \theta_1, \theta_2$, and θ_3 using gradient descent with a learning rate $\alpha = 0.1$ for 3 iterations.
