

24-787: Machine Learning and Artificial Intelligence for Engineers

Ryan Wu

ID: weihuanw

Homework 2

Due: Feb 3 2024

Concept Questions:

Problem 1

- a) The design matrix X will have the size of 11 by 3.
The parameter vector w will have the size of 3 by 1.
The product of $X'X$ will have the size of 3 by 3.
- b) The design matrix X will have the size of 1000 by 3.
The parameter vector w will have the size of 3 by 1.
The product of $X'X$ will have the size of 3 by 3.
- c) Statement 2 “The model complexity is determined by the number of model parameters” is true.

Problem 2

3rd order polynomial will perfectly interpolate these points.

Problem 3

Formulation 2 ($x_{new} = x_{old} + \eta \cdot \frac{\partial obj}{\partial x}$) will lead me to the top of the mountain.

Problem 4

Switch to stochastic gradient descent and reduce the learning rate will help resolve the oscillation issue.

Problem 5

The formulation is equivalent to an LLS with L2 regularization.