24-787: Machine Learning and Artificial Intelligence for Engineers

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Homework 2

Due: Feb 3 2024

**Concept Questions:**

Problem 1

1. 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.

1. 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.

1. 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 ) 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.