

# Linear Regression with Multiple Variables

**4/5 points (80%)**

Quiz, 5 questions

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points

1.

Suppose  $m=4$  students have taken some class, and the class had a midterm exam and a final exam. You have collected a dataset of their scores on the two exams, which is as follows:

midterm exam	(midterm exam) <sup>2</sup>	final exam
89	7921	96
72	5184	74
94	8836	87
69	4761	78

You'd like to use polynomial regression to predict a student's final exam score from their midterm exam score. Concretely, suppose you want to fit a model of the form  $h_{\theta}(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2$ , where  $x_1$  is the midterm score and  $x_2$  is (midterm score)<sup>2</sup>. Further, you plan to use both feature scaling (dividing by the "max-min", or range, of a feature) and mean normalization.

What is the normalized feature  $x_1^{(3)}$ ? (Hint: midterm = 94, final = 87 is training example 3.) Please round off your answer to two decimal places and enter in the text box below.

0 / 1  
points

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2.

You run gradient descent for 15 iterations

with  $\alpha = 0.3$  and compute

$J(\theta)$  after each iteration. You find that the

value of  $J(\theta)$  **decreases** quickly then levels

off. Based on this, which of the following conclusions seems

most plausible?

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points

3.

Suppose you have  $m = 28$  training examples with  $n = 4$  features (excluding the additional all-ones feature for the intercept term, which you should add).

The normal equation is  $\theta = (X^T X)^{-1} X^T y$ . For the given values of  $m$  and  $n$ , what are the dimensions of  $\theta$ ,  $X$ , and  $y$  in this equation?

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points

4.

Suppose you have a dataset with  $m = 50$  examples and  $n = 200000$  features for each example. You want to use multivariate linear regression to fit the parameters  $\theta$  to our data. Should you prefer gradient descent or the normal equation?

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points

5.

Which of the following are reasons for using feature scaling?

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