✖

Linear Regression with One Variable

5 questions

1.

Consider the problem of predicting how well a student does in her second year of college/university, given how well they did in their first year.

Specifically, let x be equal to the number of "A" grades (including A-. A and A+ grades) that a student receives in their first year of college (freshmen year). We would like to predict the value of y, which we define as the number of "A" grades they get in their second year (sophomore year).

Questions 1 through 4 will use the following training set of a small sample of different students' performances. Here each row is one training example. Recall that in linear regression, our hypothesis is $h_\theta(x) = \theta_0 + \theta_1 x$, and we use m to denote the number of training examples.

x	y
5	4
3	4
0	1
4	3

For the training set given above, what is the value of m? In the box below, please enter your answer (which should be a number between 0 and 10).

4

2.

Consider the following training set of $m = 4$ training examples:

x	y
1	0.5
2	1
4	2
0	0

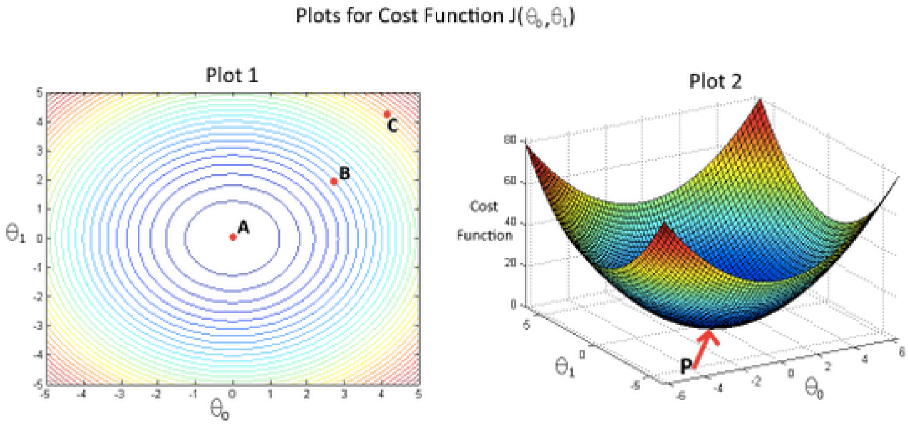
Consider the linear regression model $h_\theta(x) = \theta_0 + \theta_1 x$. What are the values of θ_0 and θ_1 that you would expect to obtain upon running gradient descent on this model? (Linear regression will be able to fit this data perfectly.)

- $\theta_0 = 0.5, \theta_1 = 0$
- $\theta_0 = 0, \theta_1 = 0.5$
- $\theta_0 = 1, \theta_1 = 1$
- $\theta_0 = 0.5, \theta_1 = 0.5$
- $\theta_0 = 1, \theta_1 = 0.5$

3.
Suppose we set $\theta_0 = -2, \theta_1 = 0.5$. What is $h_\theta(6)$?

1

4.
In the given figure, the cost function $J(\theta_0, \theta_1)$ has been plotted against θ_0 and θ_1, as shown in 'Plot 2'. The contour plot for the same cost function is given in 'Plot 1'. Based on the figure, choose the correct options (check all that apply).



- [ ] If we start from point B, gradient descent with a well-chosen learning rate will eventually help us reach at or near point A, as the value of cost function $J(\theta_0, \theta_1)$ is minimum at A.

- [ ] If we start from point B, gradient descent with a well-chosen learning rate will eventually help us reach at or near point A, as the value of cost function $J(\theta_0, \theta_1)$ is maximum at point A.

- [ ] If we start from point B, gradient descent with a well-chosen learning rate will eventually help us reach at or near point C, as the value of cost function $J(\theta_0, \theta_1)$ is minimum at point C.

- [ ] Point P (the global minimum of plot 2) corresponds to point A of Plot 1.

- [ ] Point P (The global minimum of plot 2) corresponds to point C of Plot 1.

5.

Suppose that for some linear regression problem (say, predicting housing prices as in the lecture), we

have some training set, and for our training set we managed to find some θ_0, θ_1 such that $J(\theta_0, \theta_1) = 0$. Which

of the statements below must then be true? (Check all that apply.)

- [ ] This is not possible: By the definition of $J(\theta_0, \theta_1)$, it is not possible for there to exist

  θ_0 and θ_1 so that $J(\theta_0, \theta_1) = 0$

- [ ] For this to be true, we must have $\theta_0 = 0$ and $\theta_1 = 0$

  so that $h_\theta(x) = 0$

- [ ] We can perfectly predict the value of y even for new examples that we have not yet seen.

  (e.g., we can perfectly predict prices of even new houses that we have not yet seen.)

- [ ] For these values of θ_0 and θ_1 that satisfy $J(\theta_0, \theta_1) = 0$,

  we have that $h_\theta(x^{(i)}) = y^{(i)}$ for every training example $(x^{(i)}, y^{(i)})$

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