Written exercises – graded assignment 1 – Machine Learning
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Exercise 1

a. $h_\theta\left(x^{(i)}\right) = \theta * x$

b. $J(\theta) = \frac{1}{m}\sum_{i=1}^{m}(h_\theta\left(x^{(i)}\right) - y^{(i)})^2$

c. $\frac{\partial J(\theta)}{\partial \theta} = \frac{1}{m}\sum_{i=1}^{m}\left(h\theta\left(x^{(i)}\right) - y^{(i)}\right) * x_j^{(i)}$

d. $\theta_j = \theta_j - \alpha\frac{1}{m}\sum_{i=1}^{m}(h_\theta(x^{(i)} - y^{(i)})x_j^{(i)}$

Exercise 2

$$J(\theta) = \frac{1}{2m}\sum_{i=1}^{m}(h_\theta(x^{(i)} - y^{(i)})^2$$

$$J(\theta) = \frac{1}{2m}\sum_{i=1}^{m}(\theta_0 + \theta_1 x^{(i)} - y^{(i)})^2$$

$$\frac{\partial}{\partial\theta_1}J(\theta) = \frac{1}{m}\sum_{i=1}^{m}\left((\theta_0 + \theta_1 x^{(i)} - y^{(i)}\right)\cdot x^{(i)}) = 0$$

$$\sum_{i=1}^{m}\left((\theta_0 x^{(i)} + \theta_1 x^{2\,(i)} - x^{(i)}y^{(i)}\right) = 0$$

$$\sum_{i=1}^{m}\left((\theta_0 x^{(i)}) + \sum_{i=1}^{m}(\theta_1 x^{2\,(i)}) + \sum_{i=1}^{m}(x^{(i)}y^{(i)})\right) = 0$$

$$\sum_{i=1}^{m}(\theta_1 x^{2\,(i)}) = \sum_{i=1}^{m}(x^{(i)}y^{(i)}) - \sum_{i=1}^{m}(\theta_0 x^{(i)})$$

$$\sum_{i=1}^{m}\theta_1 = \sum_{i=1}^{m}\frac{x^{(i)}y^{(i)} - \theta_0 x^{(i)}}{x^{2(i)}}$$

$$m\theta_1 = \sum_{i=1}^{m}\frac{y^{(i)} - \theta_0}{x^{(i)}}$$

$$\theta_1 = \frac{1}{m}\sum_{i=1}^{m}\frac{y^{(i)} - \theta_0}{x^{(i)}}$$