Linear Regression – Intuition – III

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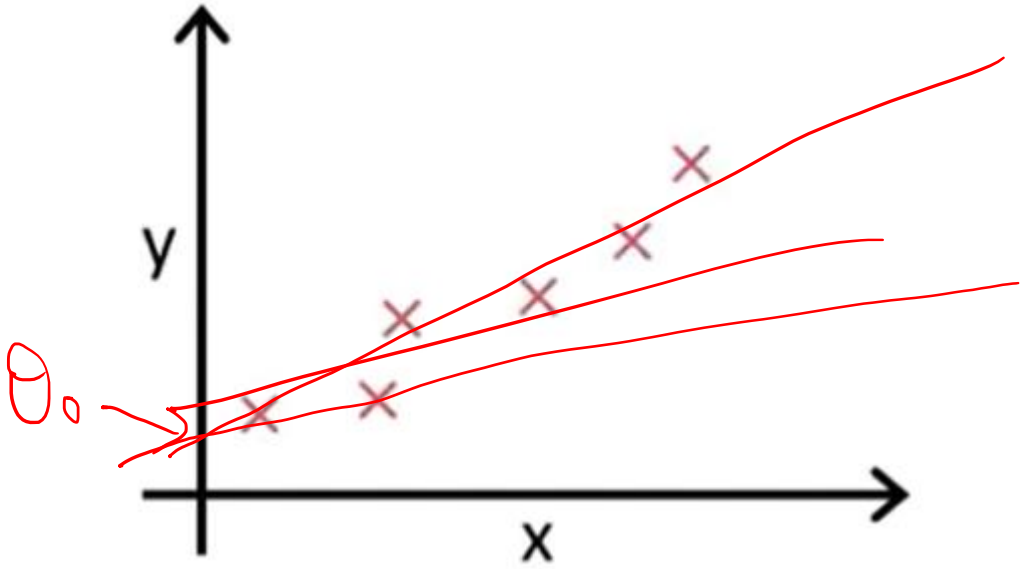
Linear Regression



Idea: Choose θ_0, θ_1 so that $h_\theta(x)$ is close to y for all the training examples.

Linear Regression

- Hypothesis
$$h_\theta(x) = \theta_0 + \theta_1 x$$
- Parameters
$$\theta_0, \theta_1$$
- Cost Function
$$J(\theta_0, \theta_1) = \frac{1}{2m} \sum_{i=1}^{m} \left(h_\theta\left(x^{(i)}\right) - y^{(i)}\right)^2$$
- Goal:
$$minimize_{\theta_0,\theta_1} J(\theta_0, \theta_1)$$

Let us use a simple hypothesis

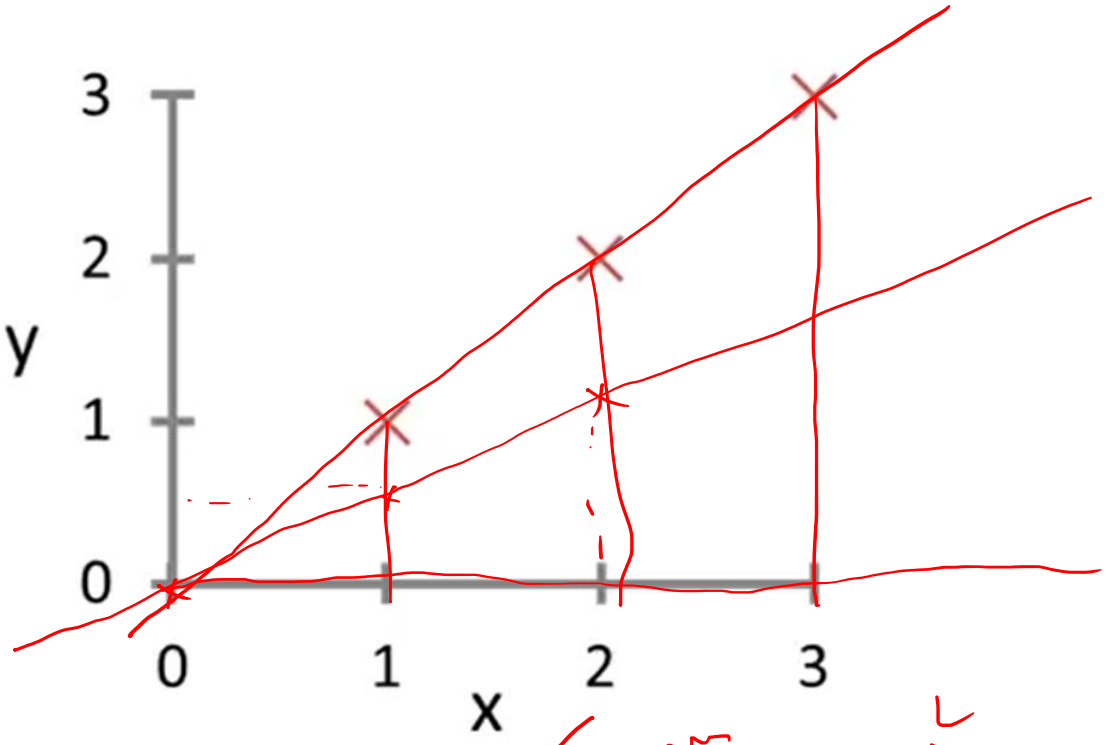
$$h_\theta(x) = \theta_1 x \qquad \theta_0 = 0$$

$$\theta_1$$

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

$$minimize_{\theta_0,\theta_1} J(\theta_1)$$

How cost function behaves for different hypothesis?



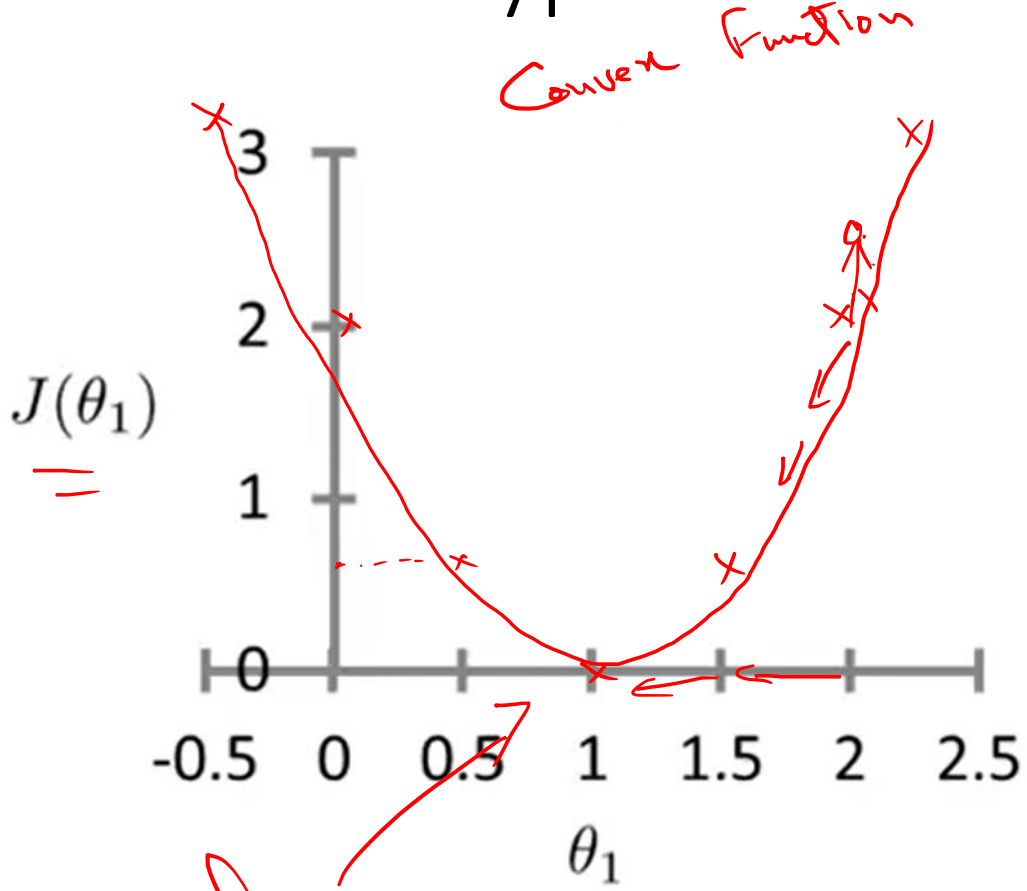
$\theta_1 = 0.5$

$J(\theta_1) \approx 0.58$

$\theta_0 = 0$

$\theta_1 = 1$

$\frac{1}{2m}\sum_{i=1}^{m}(y_i - \hat{y}_i)^2 = 0$



Convex Function

Global Minima