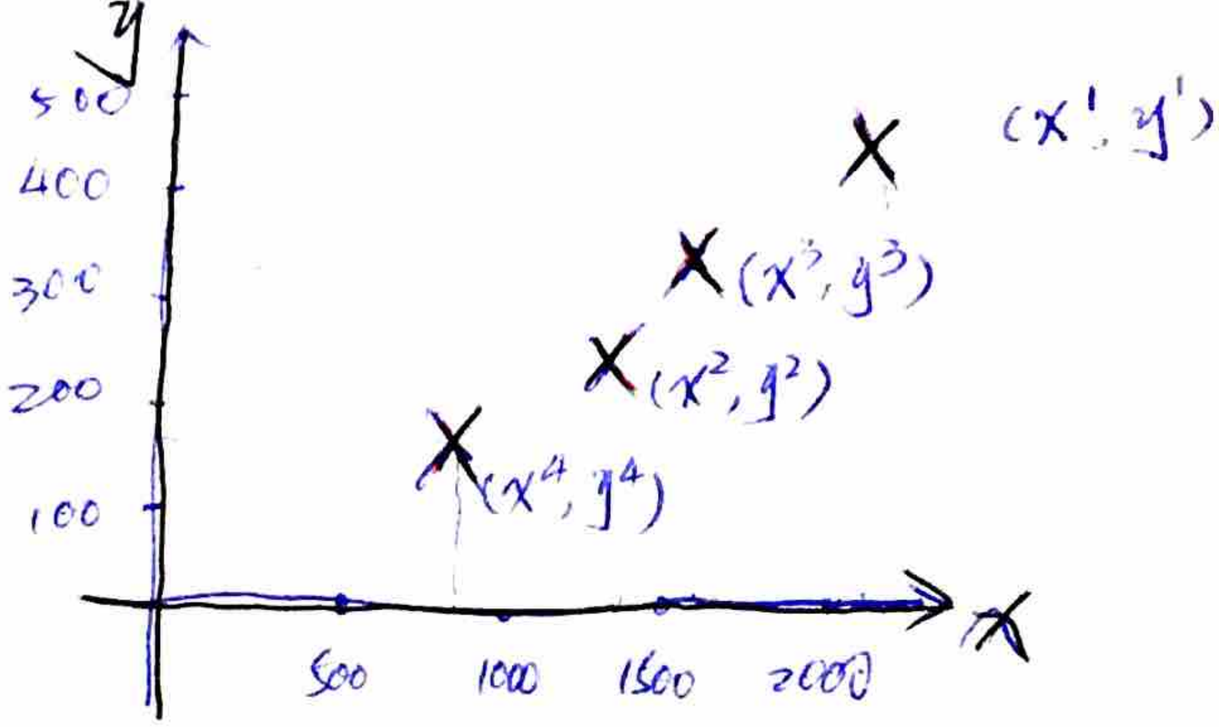
x	y
2104	460
1416	232
1534	315
825	178



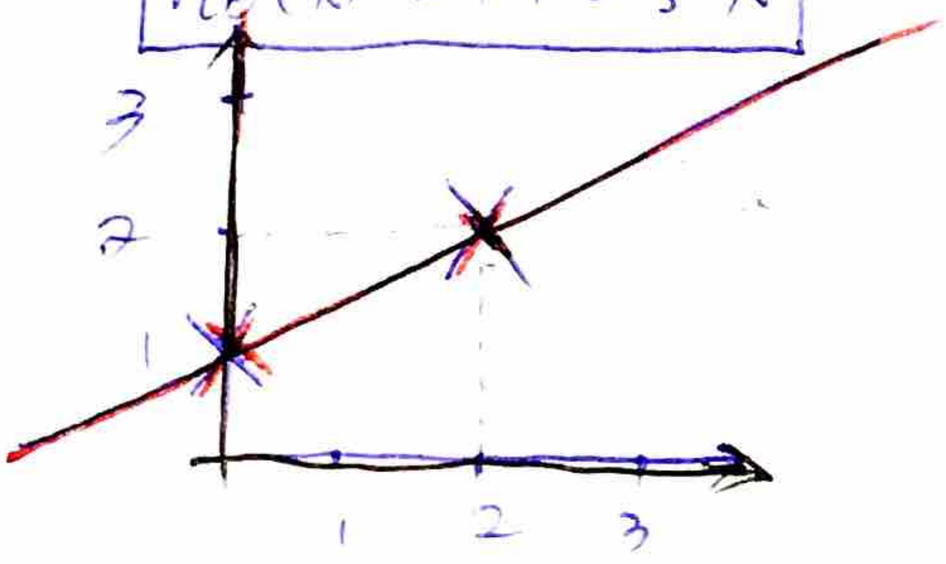
Hypothesis

$$H : h_\theta(x) = \theta_0 + \theta_1 x$$

$$\hat{y} = h(x \mid \theta_0, \theta_1)$$

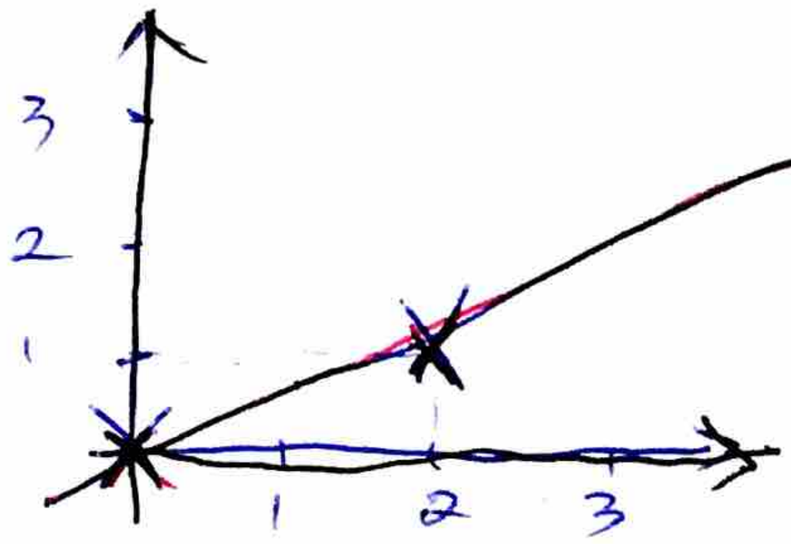
$\theta_0 = 1, \quad \theta_1 = 0.5$

$h_\theta(x) = 1 + 0.5x$



$\theta_0 = 0, \quad \theta_1 = 0.5$

$h_\theta(x) = 0.5x$



cost Fuction:

m training point : $(x^1, y^1), (x^2, y^2), \cdots, (x^m, y^m)$

$$[h_\theta(x^1) - y^1]^2 + [h_\theta(x^2) - y^2]^2 + \cdots + [h_\theta(x^m) - y^m]^2$$

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

3 2 1

$h_\theta(x^i) = \theta_0 + \theta_1 x^i$

minimize $J(\theta_0, \theta_1)$
θ_0, θ_1

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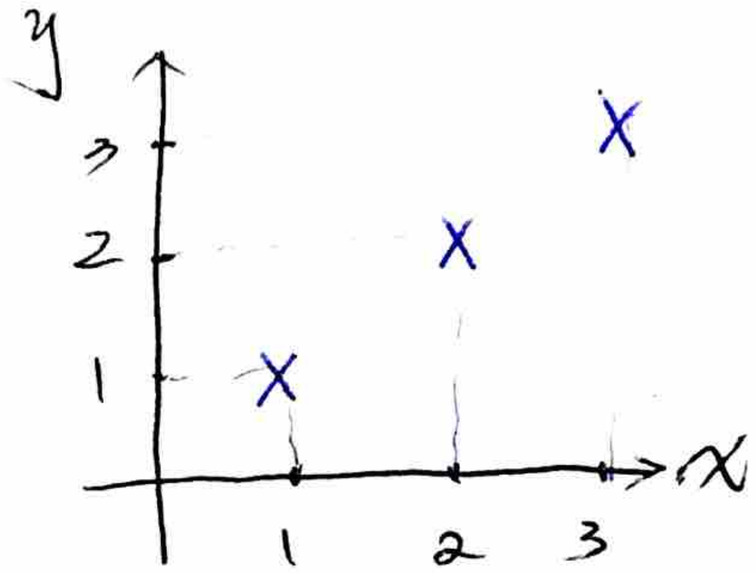
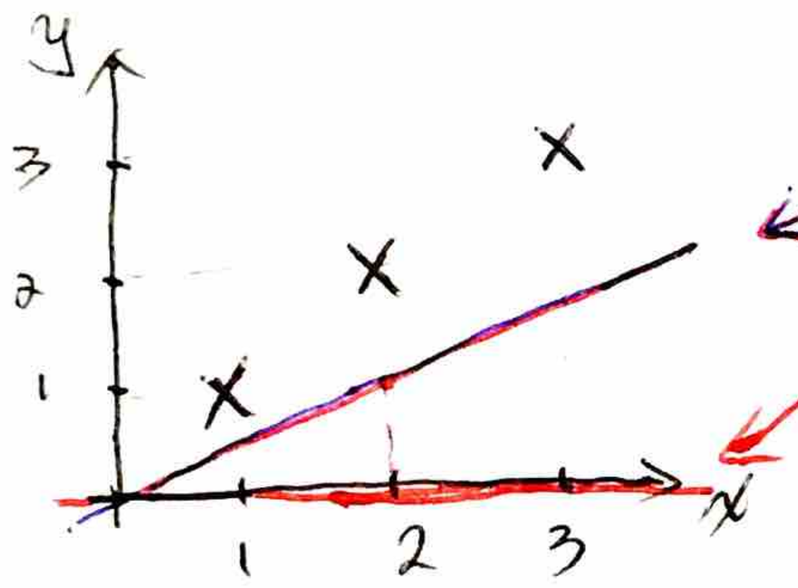
minimize $J(\theta_0, \theta_1)$
θ_0, θ_1

x	y
1	1
2	2
3	3



$h_\theta(x) = \theta x$

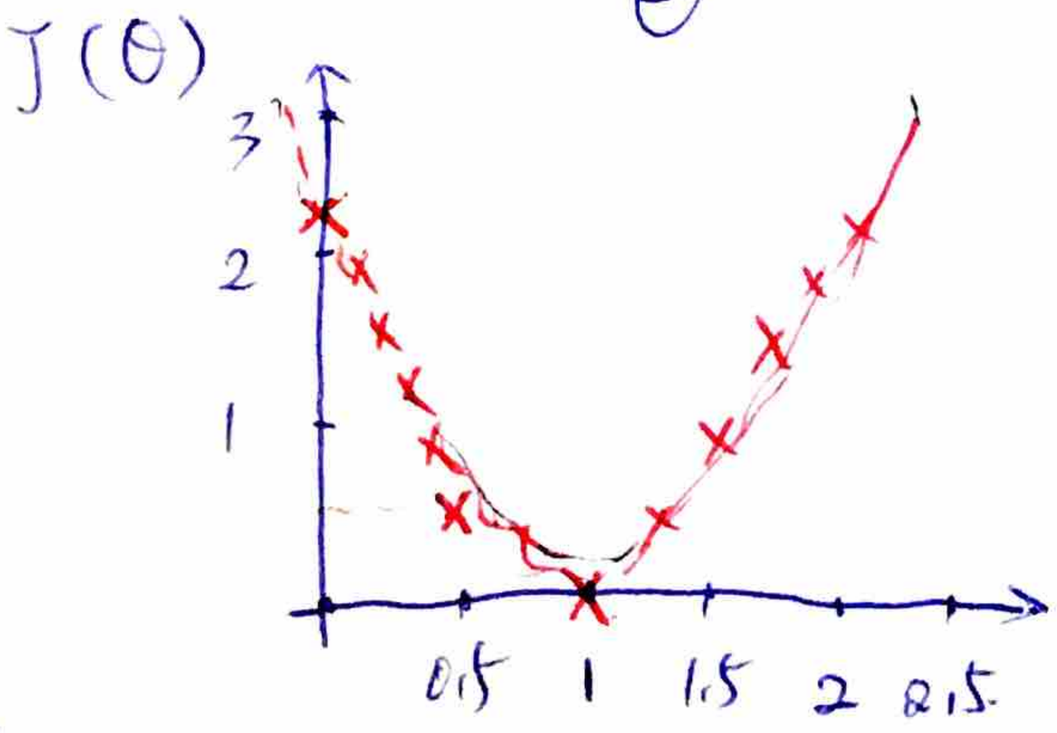
$J(\theta) = \frac{1}{2m} \sum_{i=1}^{m} [h_\theta(x^i) - y^i]^2$



$\theta = 0.5$ $J(0.5) = \frac{1}{2\times3}[(0.5\times1-1)^2 + (0.5\times2-2)^2 + (0.5\times3-3)^2]$
≈ 0.58.

$\theta = 0$ $J(0) = \frac{1}{2\times3}[(0-1)^2 + (0-2)^2 + (0-3)^2]$
≈ 2.3

$\theta = 1$ $J(1) = \frac{1}{2\times3}[\cdots] \approx 0$



$J(\theta) = \frac{1}{2\times3}[(\theta-1)^2 + (\theta-2)^2 + (\theta-3)^2]$
$= \frac{1}{6}[\theta^2 - 2\theta + 1 + \theta^2 - 4\theta + 4 + \theta^2 - 6\theta + 9]$
$= \frac{1}{2}\theta^2 - 2\theta + \frac{14}{6}$

θ' J(θ)

2/2

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