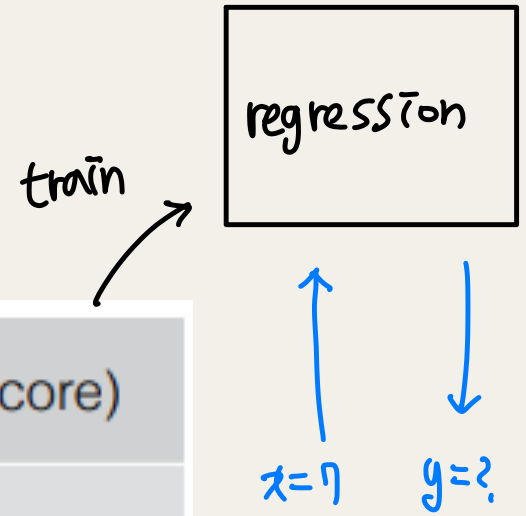
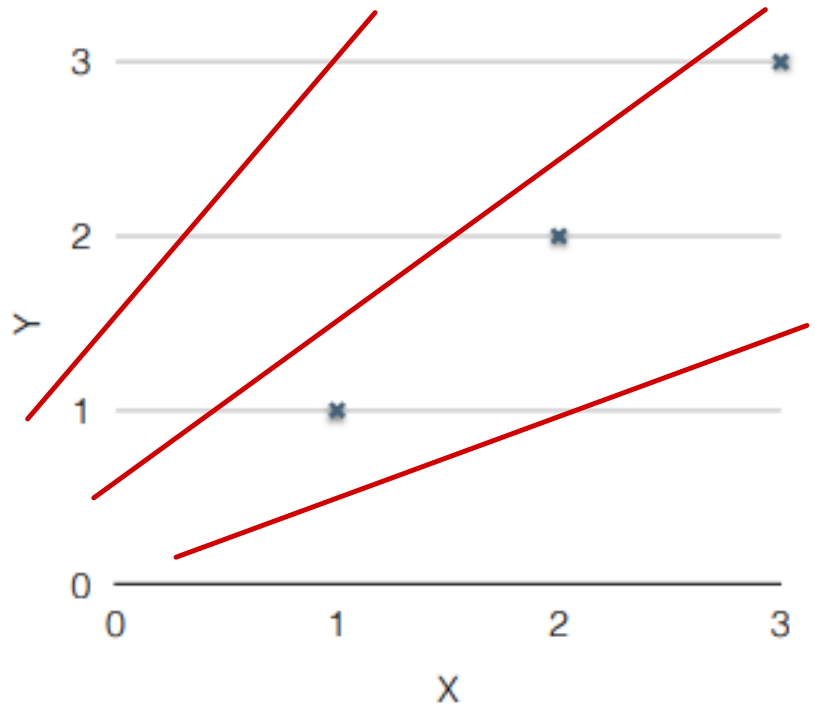
Linear regression



x (hours)	y (score)
10	90
9	80
3	50
2	30

(Linear) Hypothesis

x	Y
1	1
2	2
3	3



가설을 세워 linear하게 되는것이 맞을 것이라 판단

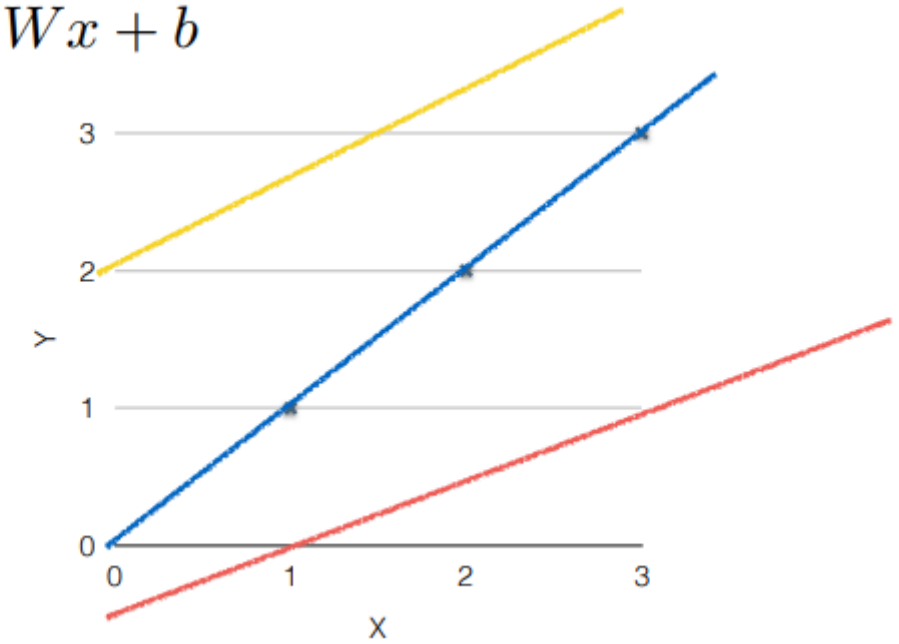
COST FUNTION

거리가 음수, 양수 판단

$(H(x) - y)^2$

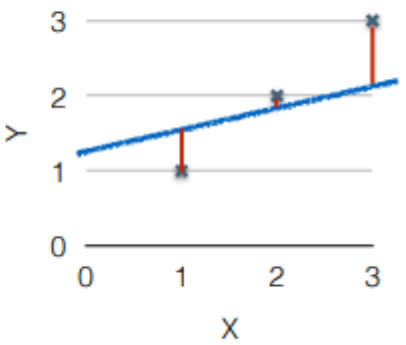
어떤 그래프가 가장 알맞을지?

$H(x) = Wx + b$



$$\frac{(H(x^{(1)}) - y^{(1)})^2 + (H(x^{(2)}) - y^{(2)})^2 + (H(x^{(3)}) - y^{(3)})^2}{3}$$

$H(x) = Wx + b$



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

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$$H(x) = Wx + b$$

가장 작은 cost값을 구하는 것이 linear 학습

$$cost(W, b) = \frac{1}{m}\sum_{i=1}^{m}(H(x^{(i)}) - y^{(i)})^2$$

$$H(x) = Wx$$

$$cost(W) = \frac{1}{m}\sum_{i=1}^{m}(Wx^{(i)} - y^{(i)})^2$$

Gradient descent algorithm

(경사) (내려감)

↳ 경사를 따라 내려 가는 알고리즘.

Start : (0,0) (or any other value) → 반복

W를 바꾸며 cost를 줄여나감

↳ 최저점 도달.

$$cost(W) = \frac{1}{m}\sum_{i=1}^{m}(Wx^{(i)} - y^{(i)})^2$$

x	Y
1	1
2	2
3	3

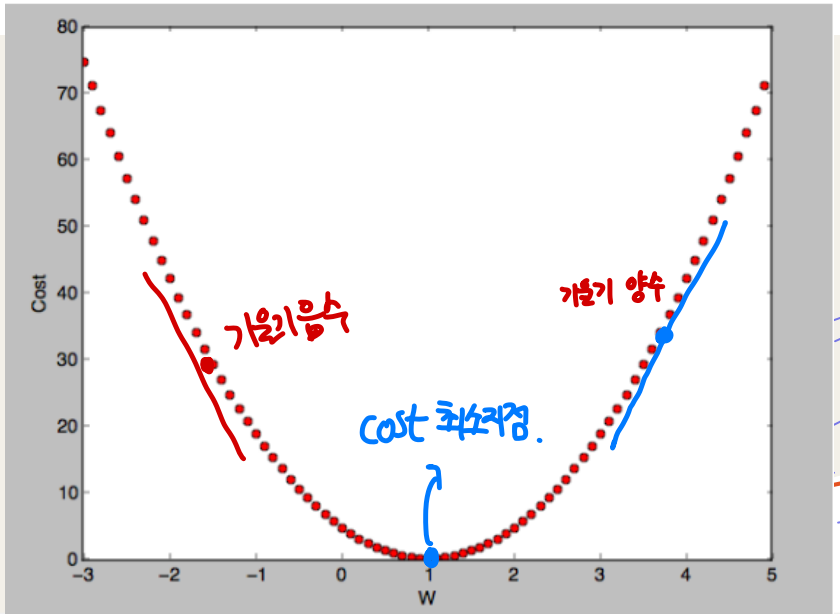
- W=1, cost(W)=0

$$\frac{1}{3}((1*1-1)^2 + (1*2-2)^2 + (1*3-3)^2)$$

- W=0, cost(W)=4.67

$$\frac{1}{3}((0*1-1)^2 + (0*2-2)^2 + (0*3-3)^2)$$

- W=2, cost(W)=?



Formal definition

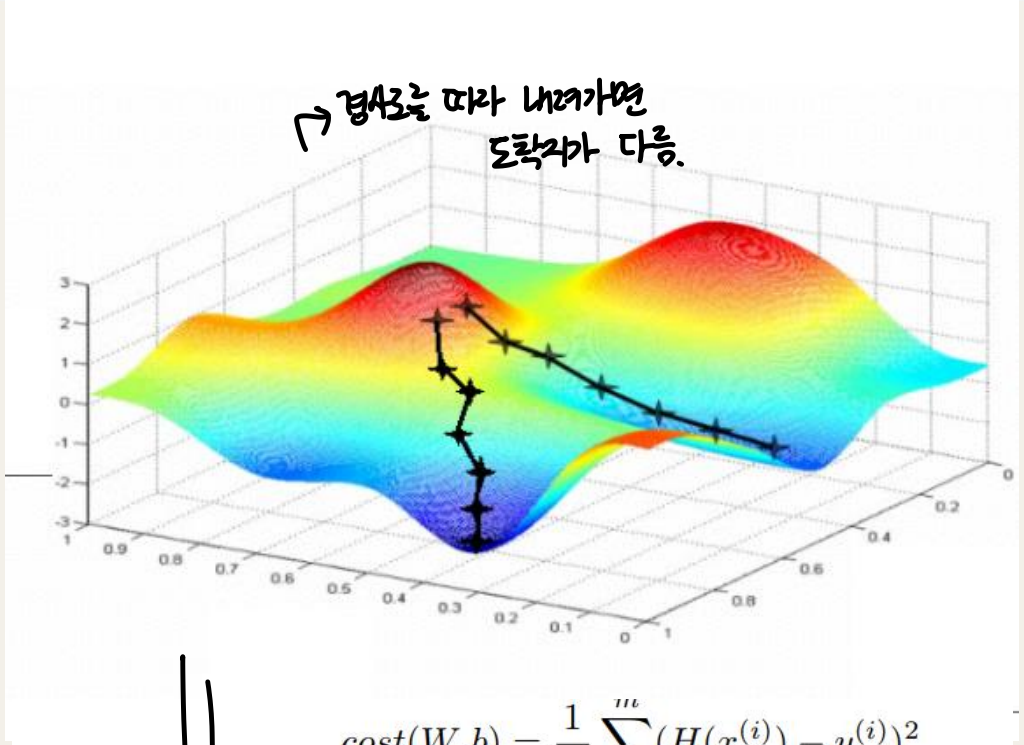
↳ 경사도 계산 : 미분 → 기울기를 계산

$$W := W - \alpha \frac{\partial}{\partial W} \frac{1}{2m} \sum_{i=1}^{m} (Wx^{(i)} - y^{(i)})^2$$

↳ 미분을 편하게 하기 위해

$$W := W - \alpha \frac{1}{2m} \sum_{i=1}^{m} 2(Wx^{(i)} - y^{(i)})x^{(i)}$$

$$W := W - \alpha \frac{1}{m} \sum_{i=1}^{m} (Wx^{(i)} - y^{(i)})x^{(i)}$$



$$cost(W, b) = \frac{1}{m} \sum_{i=1}^{m} (H(x^{(i)}) - y^{(i)})^2$$