Lecture 2

Linear Regression

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Acknowledgement

- Andrew Ng's ML class
  - https://class.coursera.org/ml-003/lecture
  - http://www.holehouse.org/mlclass/ (note)
- Convolutional Neural Networks for Visual Recognition.
  - http://cs231n.github.io/
- Tensorflow
  - https://www.tensorflow.org
  - https://github.com/aymericdamien/TensorFlow-Examples

Predicting exam score: regression

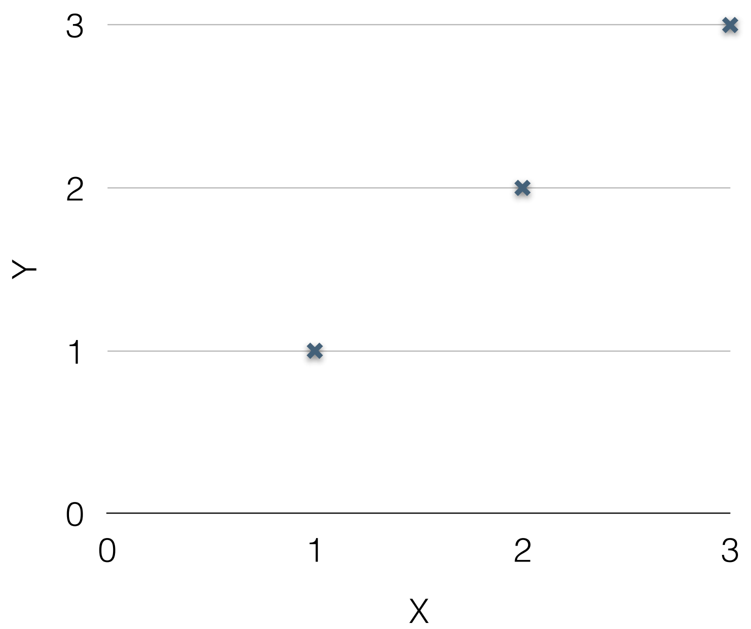
x (hours)	y (score)
10	90
9	80
3	50
2	30

Regression (data)

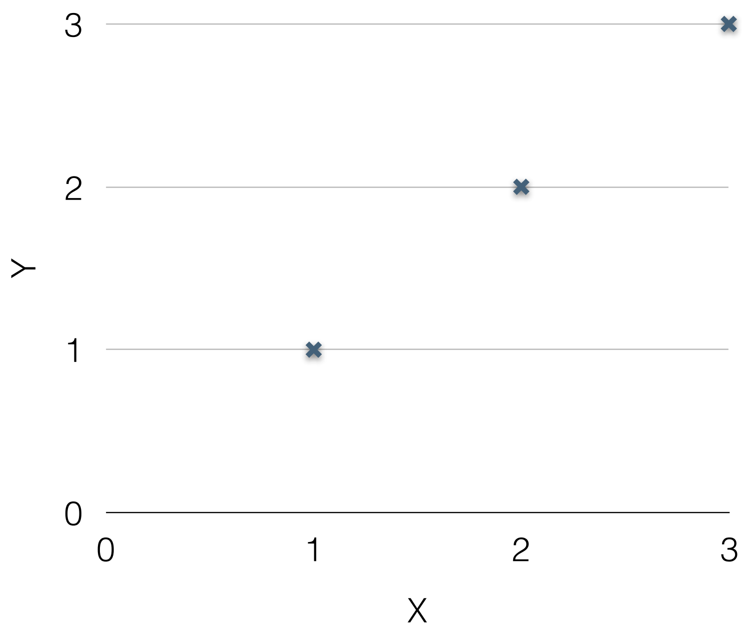
x	y
1	1
2	2
3	3

Regression (presentation)

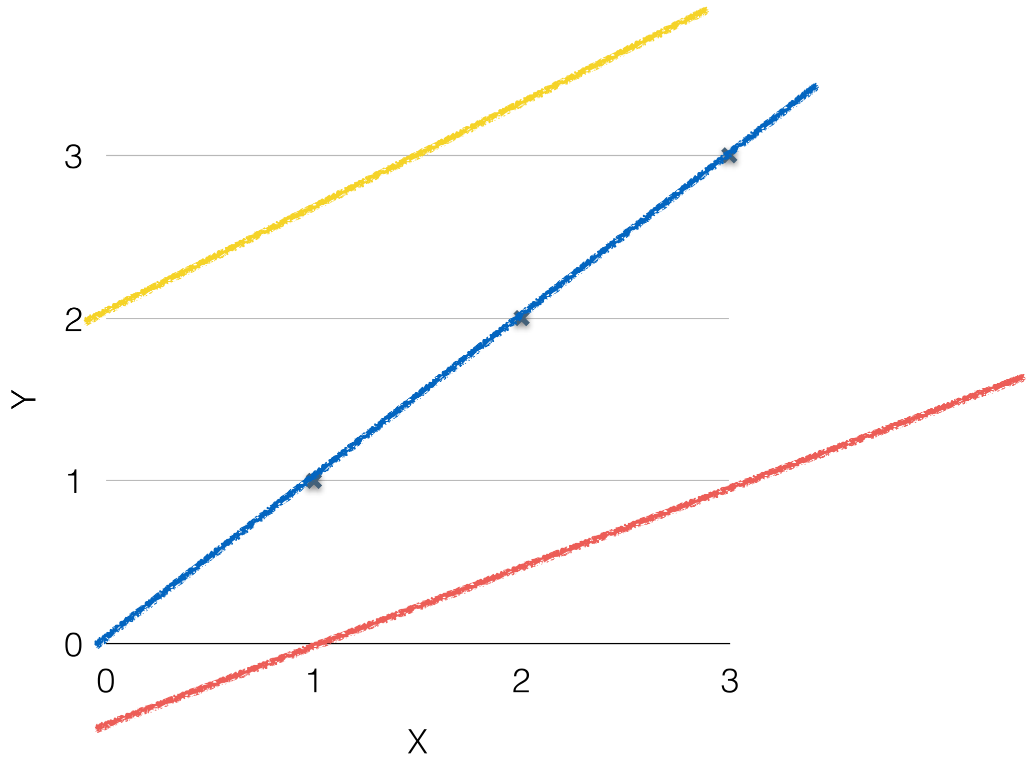
X	Y
1	1
2	2
3	3



(Linear) Hypothesis

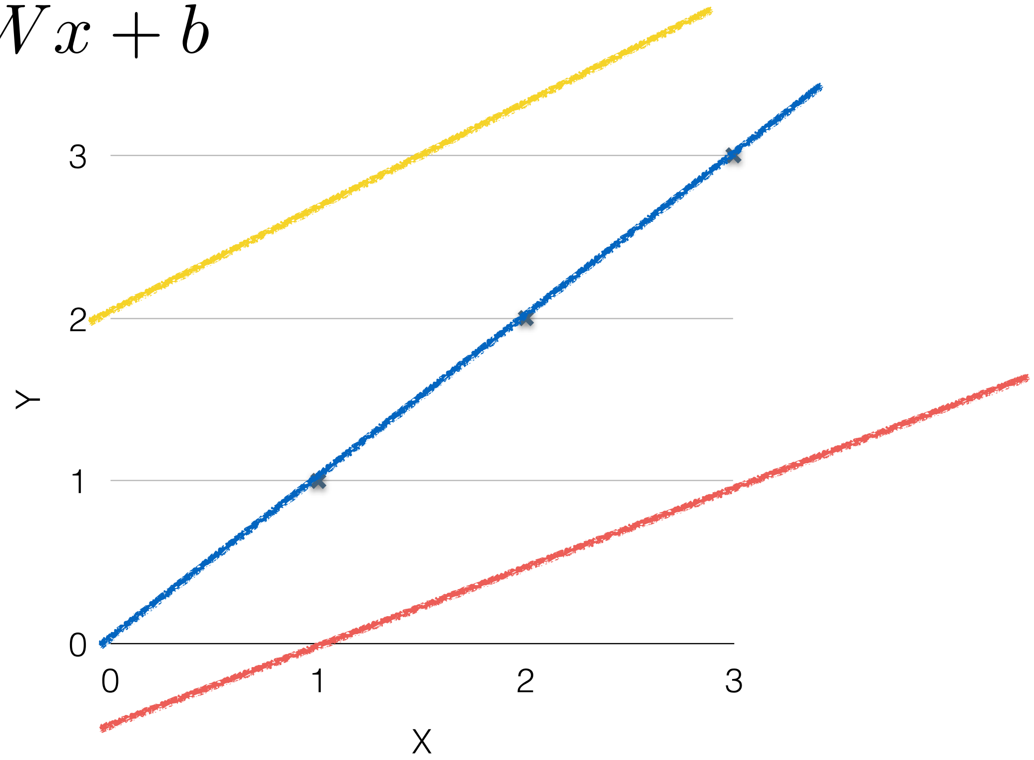


(Linear) Hypothesis

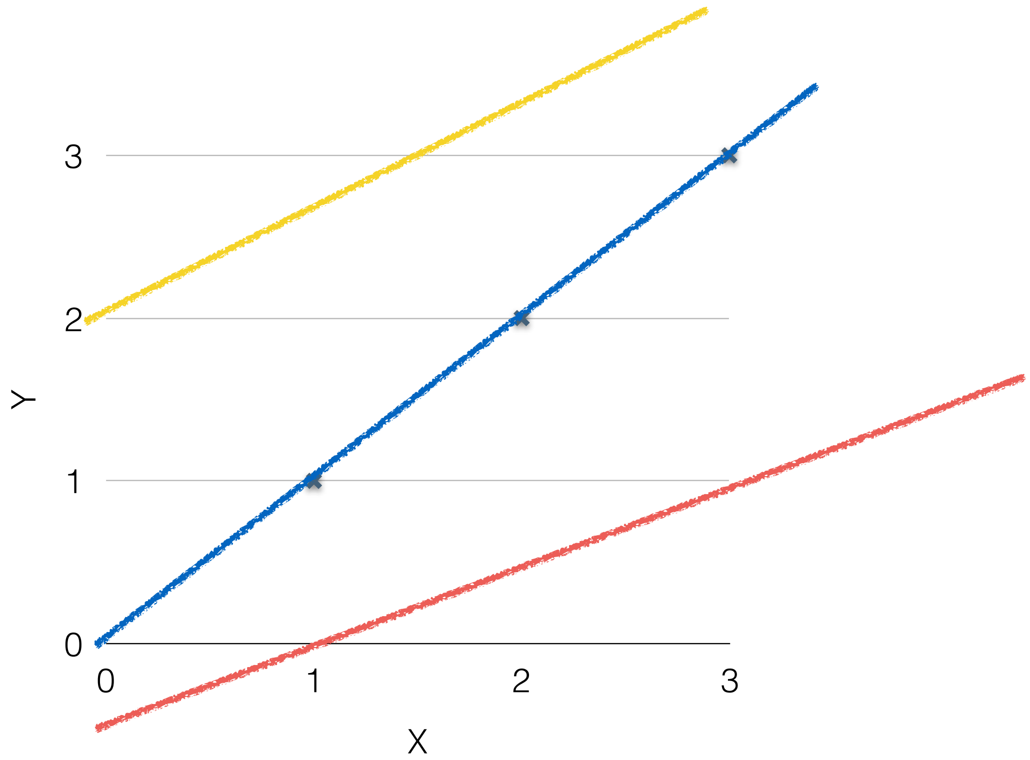


(Linear) Hypothesis

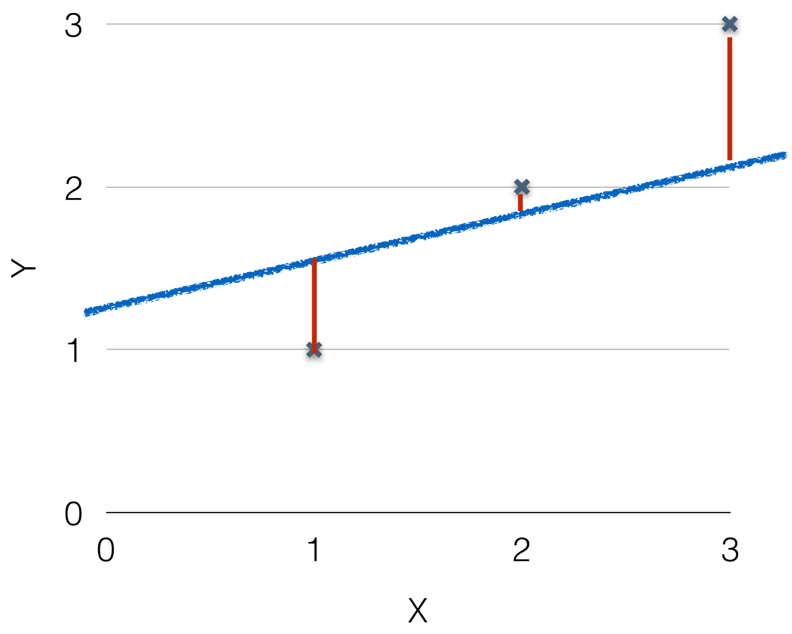
$$H(x) = Wx + b$$



Which hypothesis is better?



Which hypothesis is better?

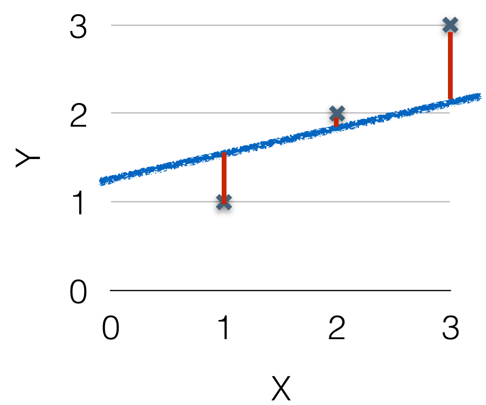


Loss
Cost function

- How fit the line to our (training) data

$$\cancel{H(x) - y}$$

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

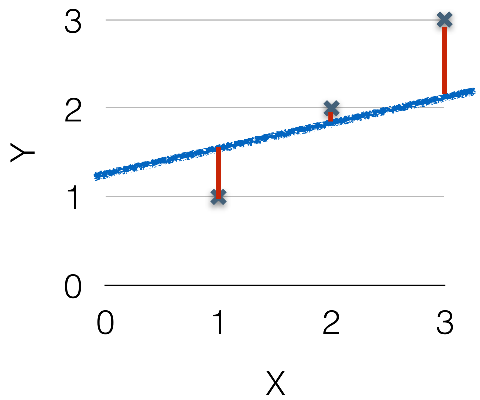


Cost function

- How fit the line to our (training) data

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

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



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

Cost function

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

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

Weights bias

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

Goal: Minimize cost

$$\underset{W,b}{\text{minimize}}\, cost(W, b)$$