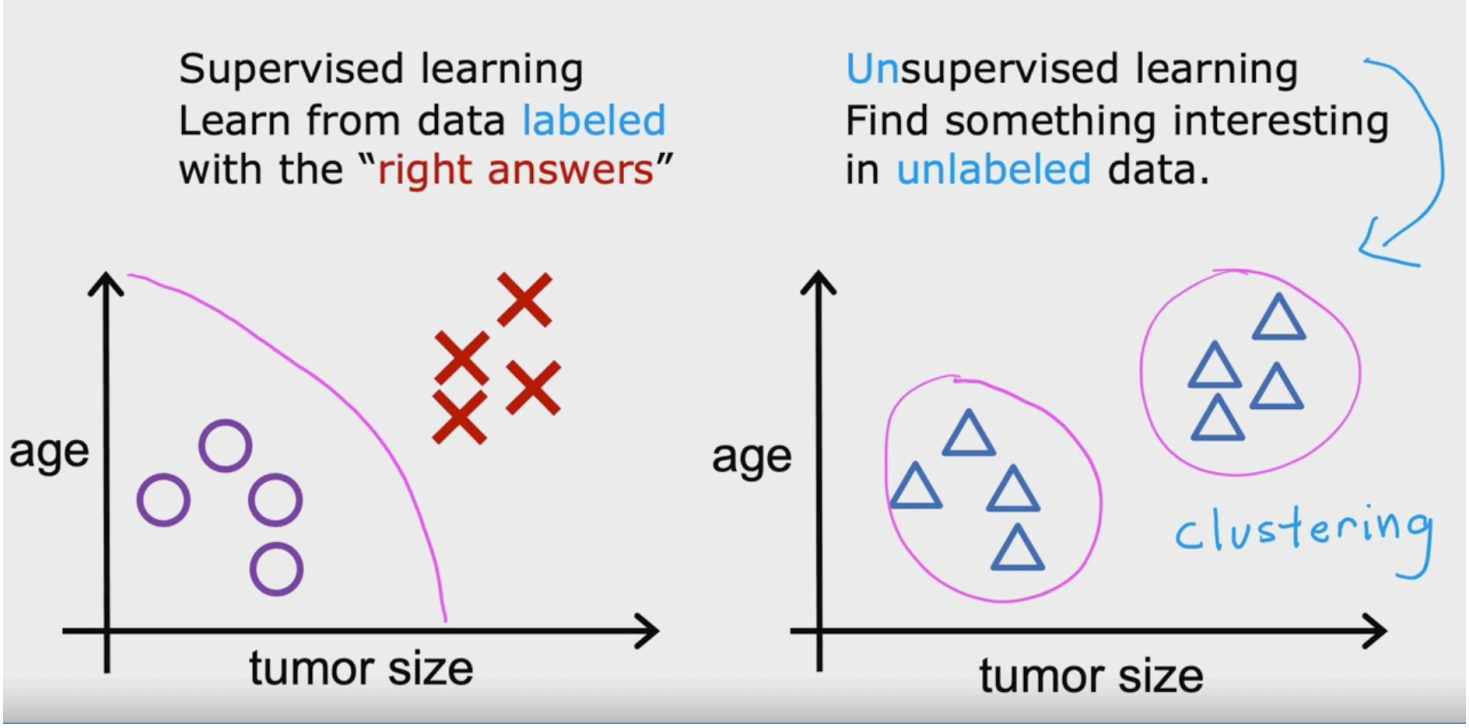
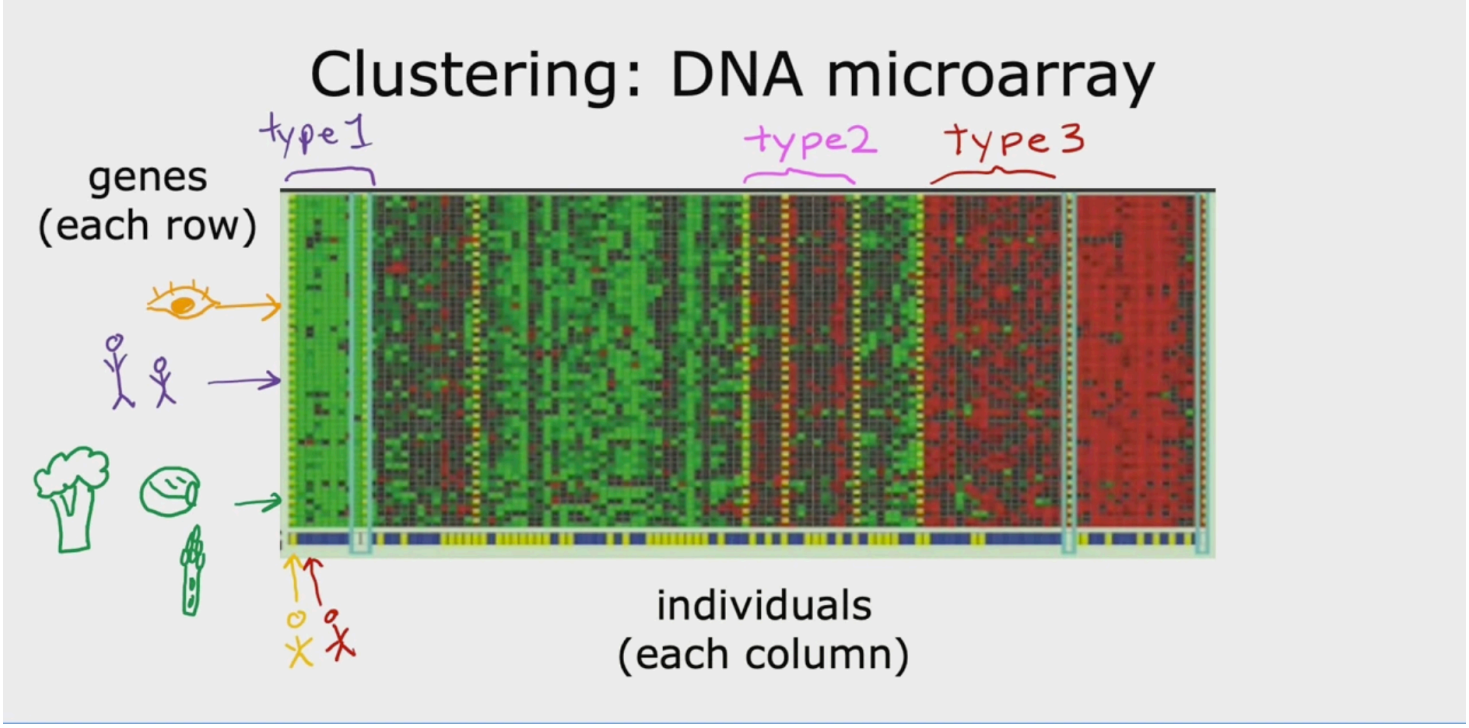
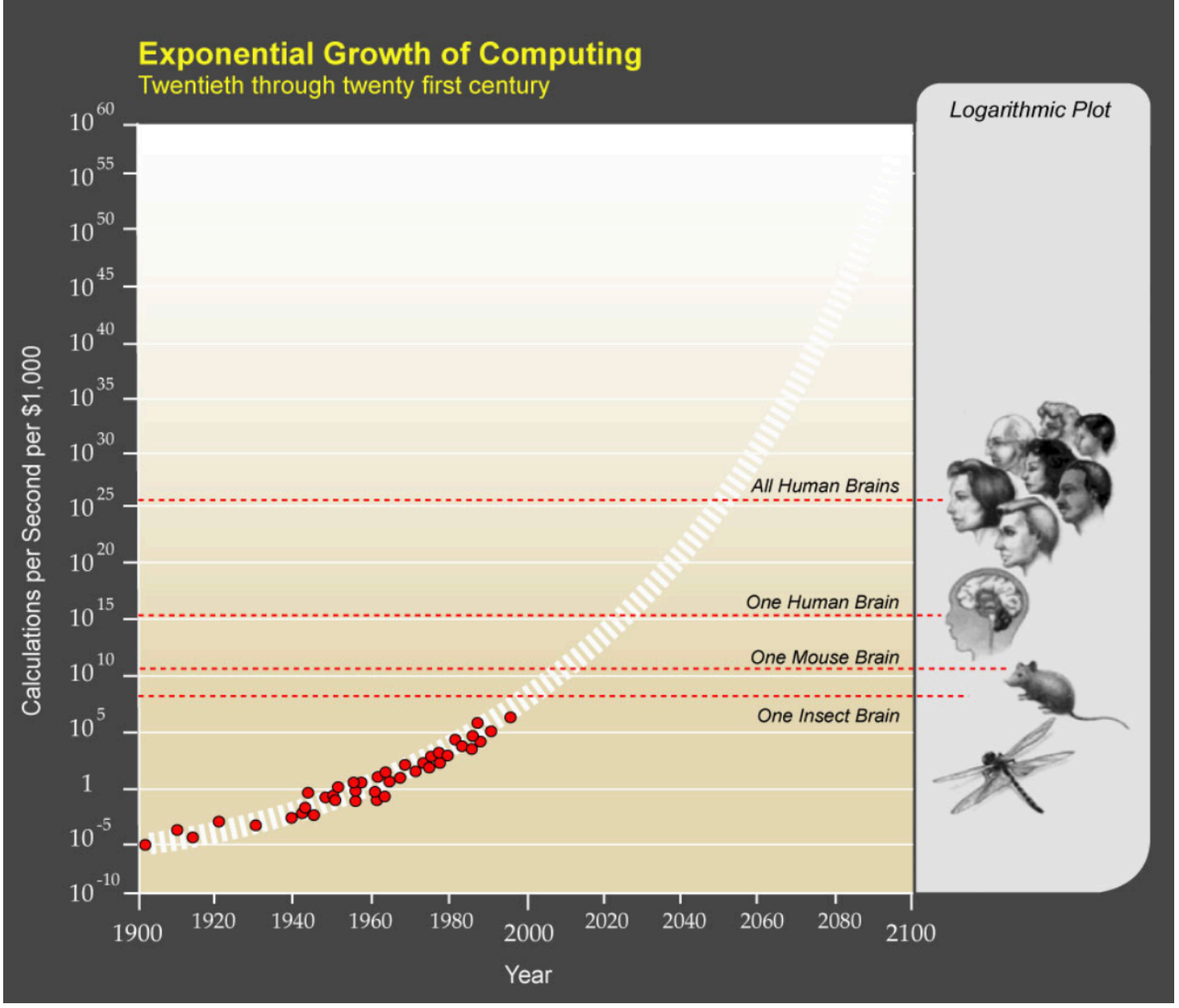
Supervised Machine Learning

Supervised Learning:
Regression (House Prices) - Classification (Breast Cancer Detection)
Unsupervised Learning:

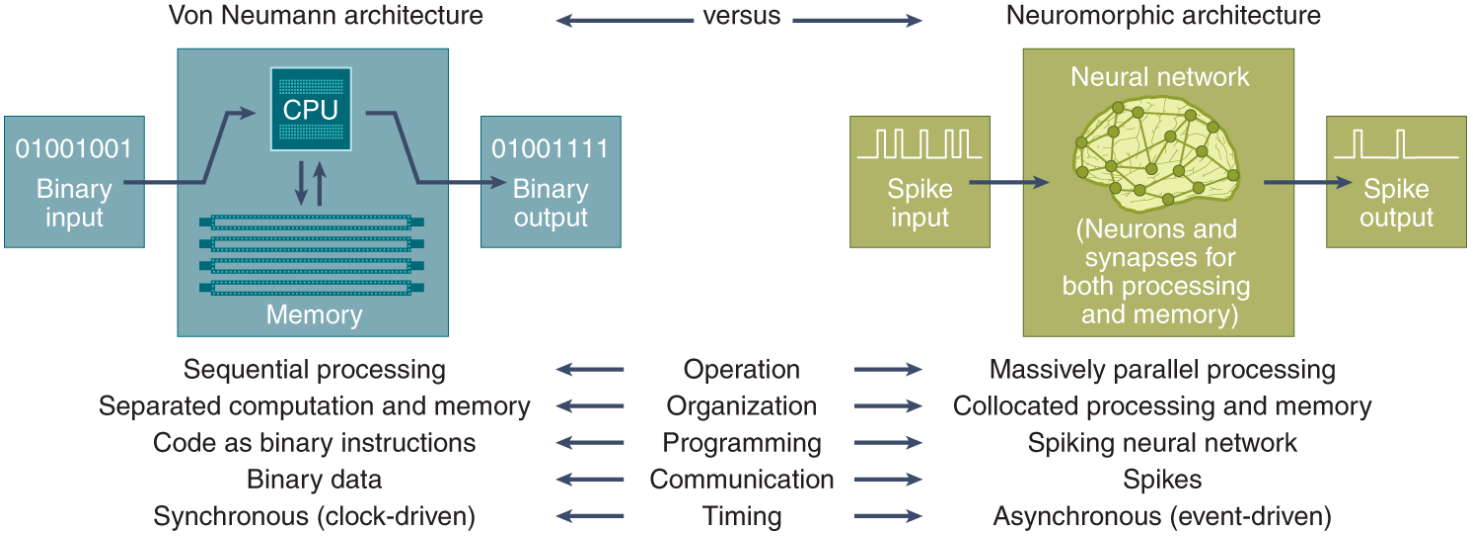




https://towardsdatascience.com/fine-tuning-large-language-models-llms-23473d763b91



Neuromorphic Computing



Sequential processing	Operation	Massively parallel processing
Separated computation and memory	Organization	Collocated processing and memory
Code as binary instructions	Programming	Spiking neural network
Binary data	Communication	Spikes
Synchronous (clock-driven)	Timing	Asynchronous (event-driven)

Architecture of AlexNet

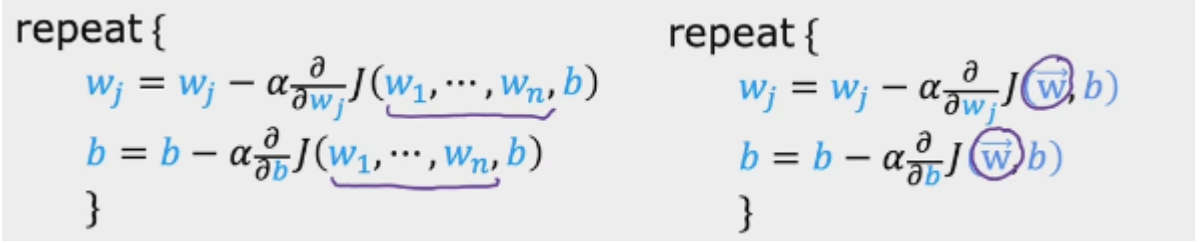
f = np.dot(w,x) + b

Cost function:

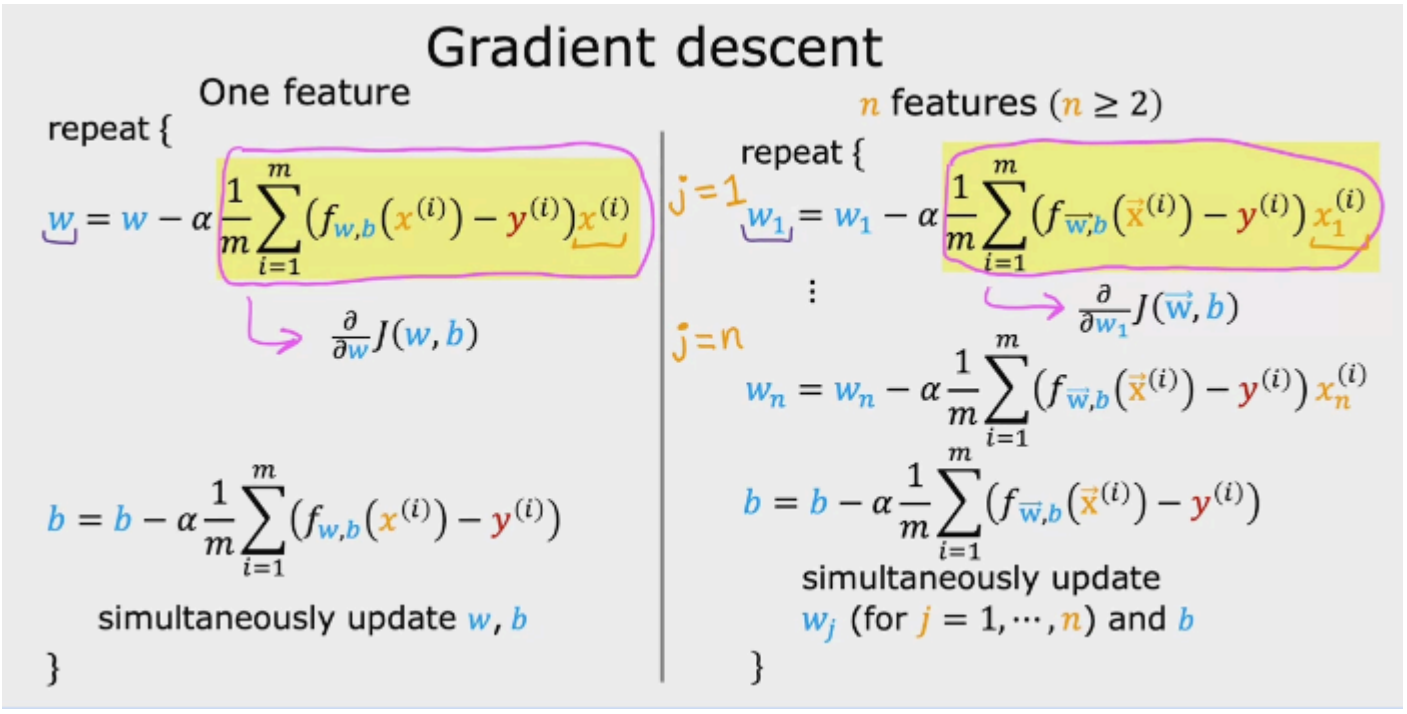
j(w*,b)

j(w1,w2…,wn,b)

Gradient Descent



gradient descent for multiple regression



gradient descent to find parameter values:

ax+by+cz+ k

finds a,b,c.

upside down hill. finds the bottom.

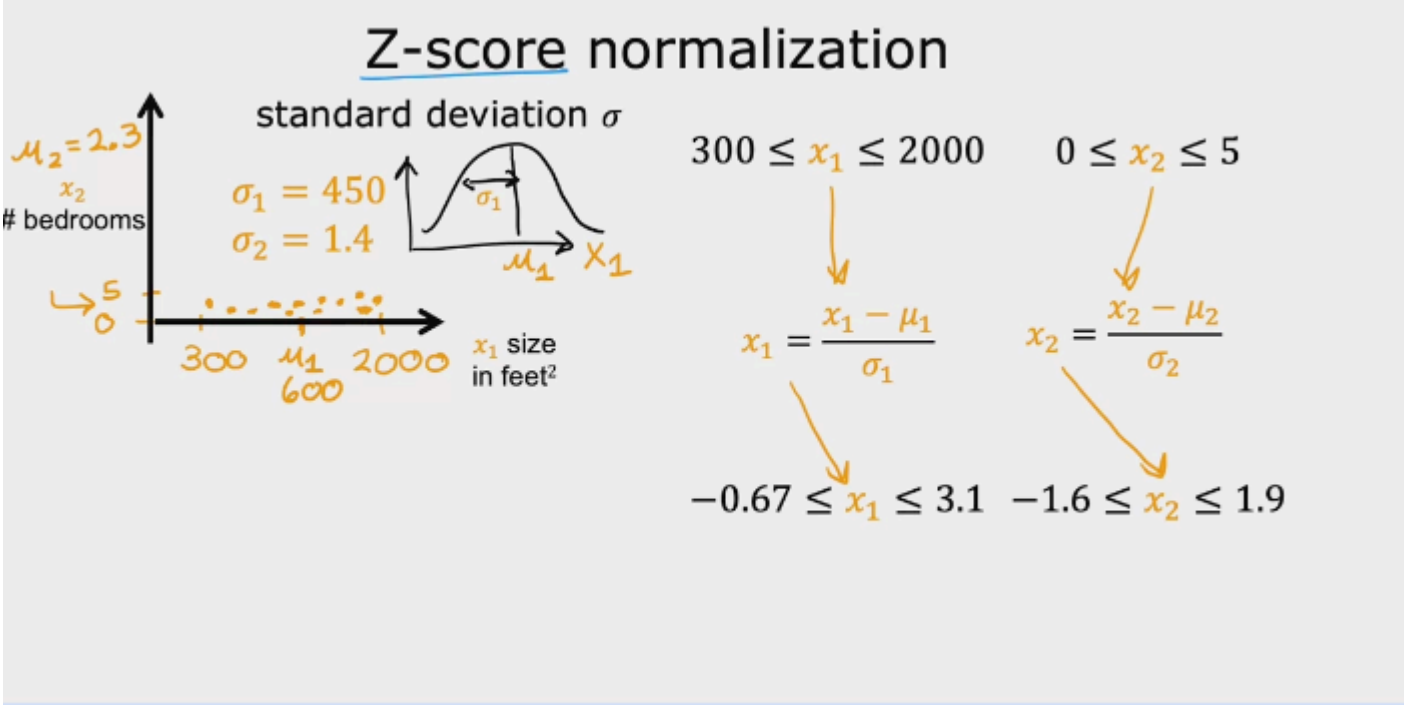
rescaling the parameters

x between 300 and 2k, y between 0 and 5:

Option 1: x/2k, y/5

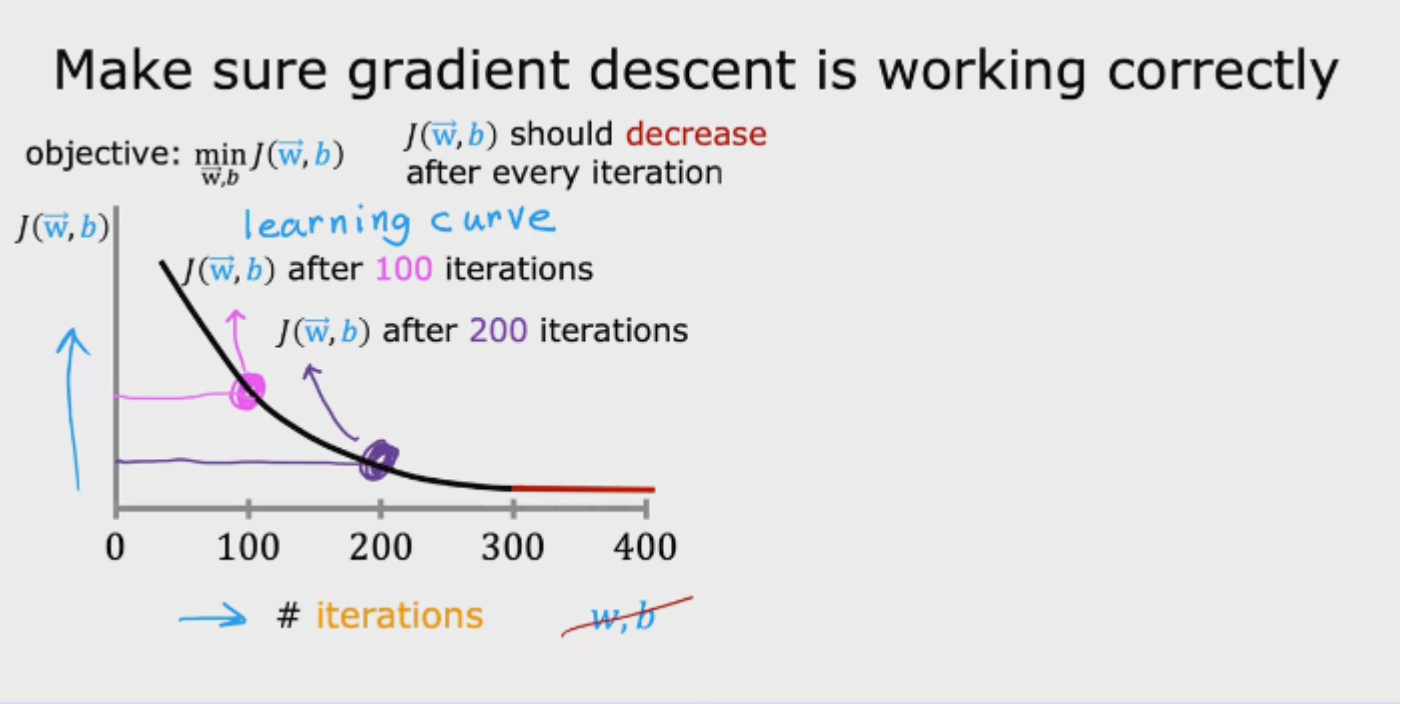
Option 2: Find mean (average), (x - mean)/(2000 - mean/2) and so on.

Option 3: Z score normalization

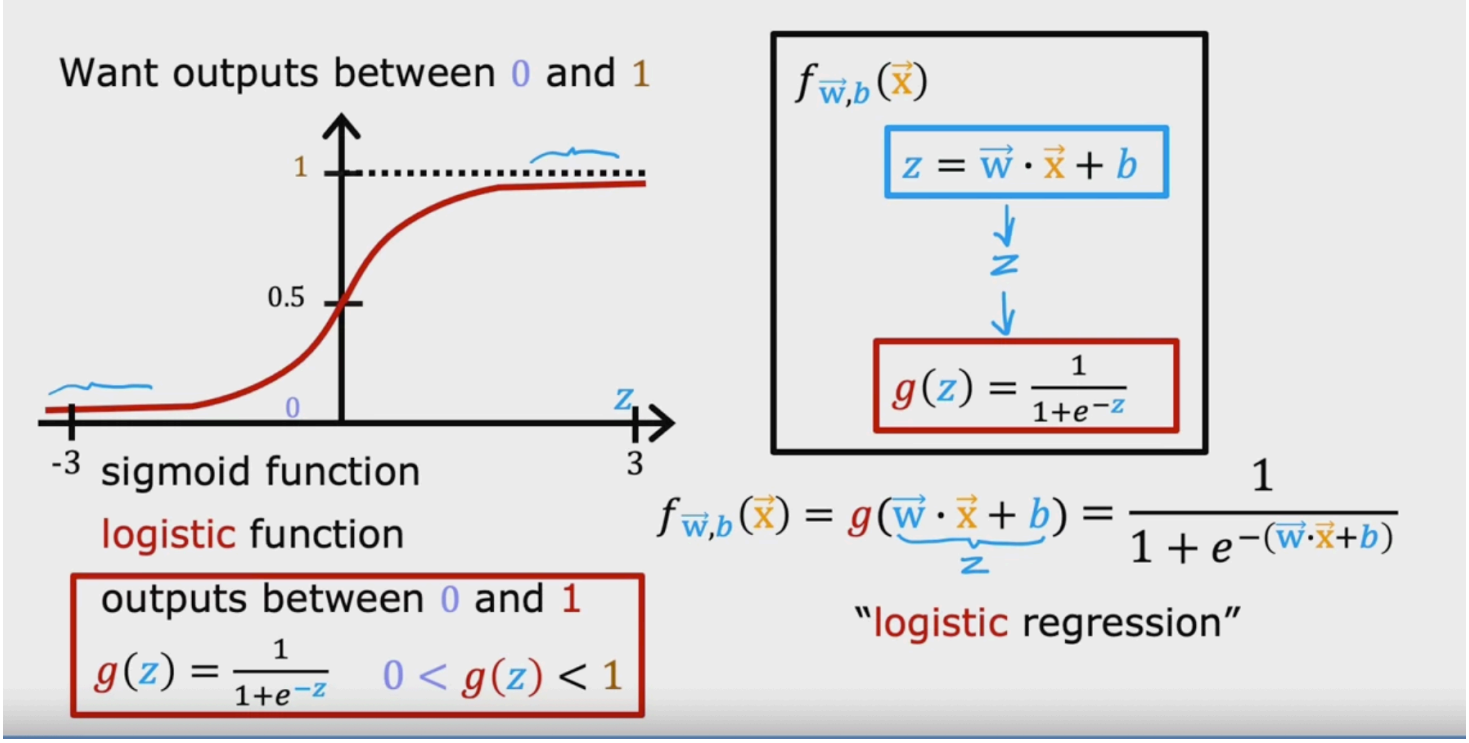


Best practice, between -1 and 1, or -n and n.

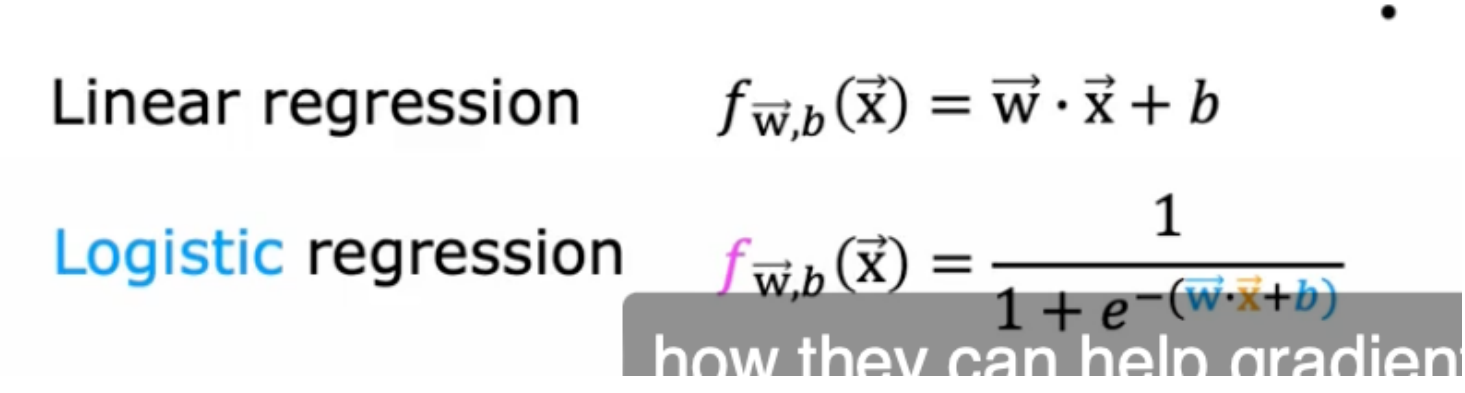
Do not put too much size differences between the parameters:
x1 0 and 3
x2 -0,5 and 2
x3 -100 and 100 Not good



J - cost function should be decreasing
choose of learning rate, (powers of 10)
Logistic Regression Model:

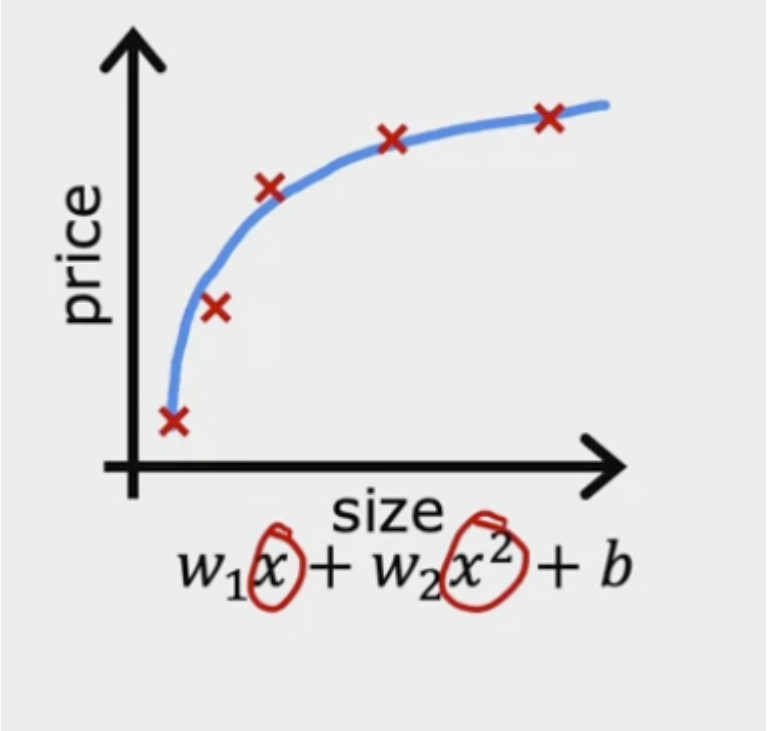


probability that the things is “1”

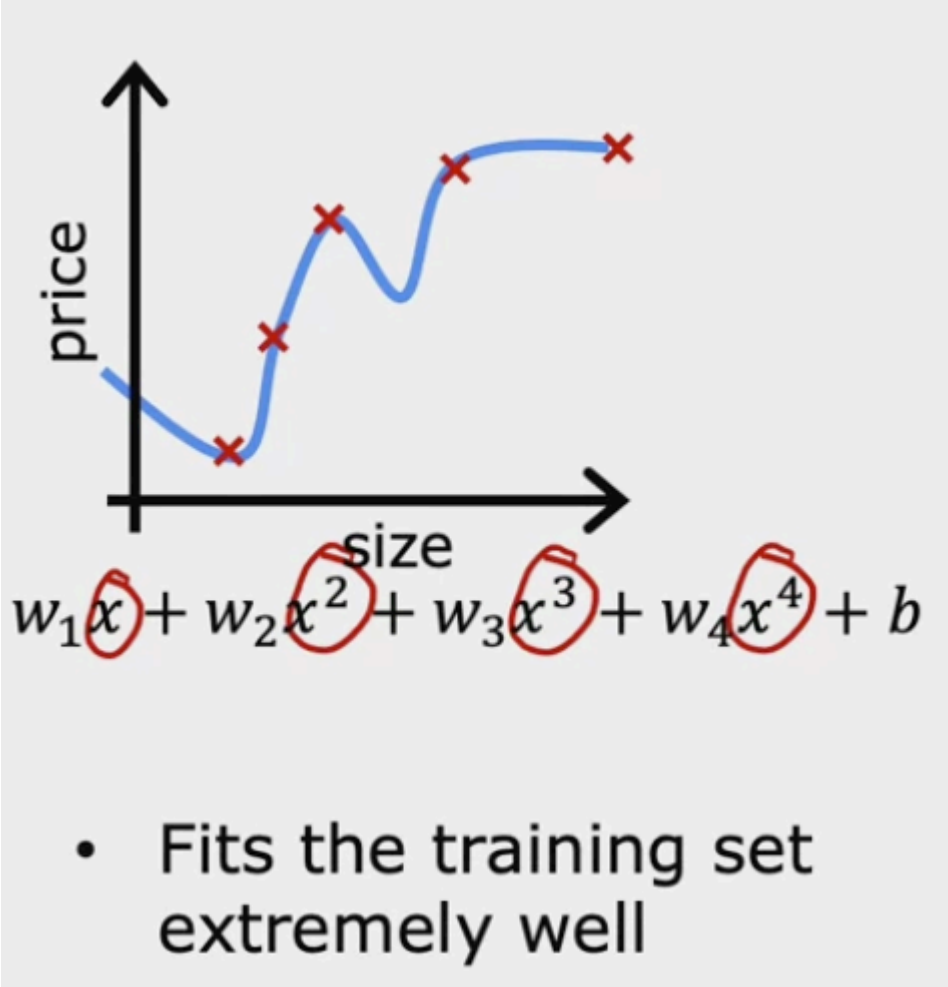


Regularization: helps minimize overfitting.

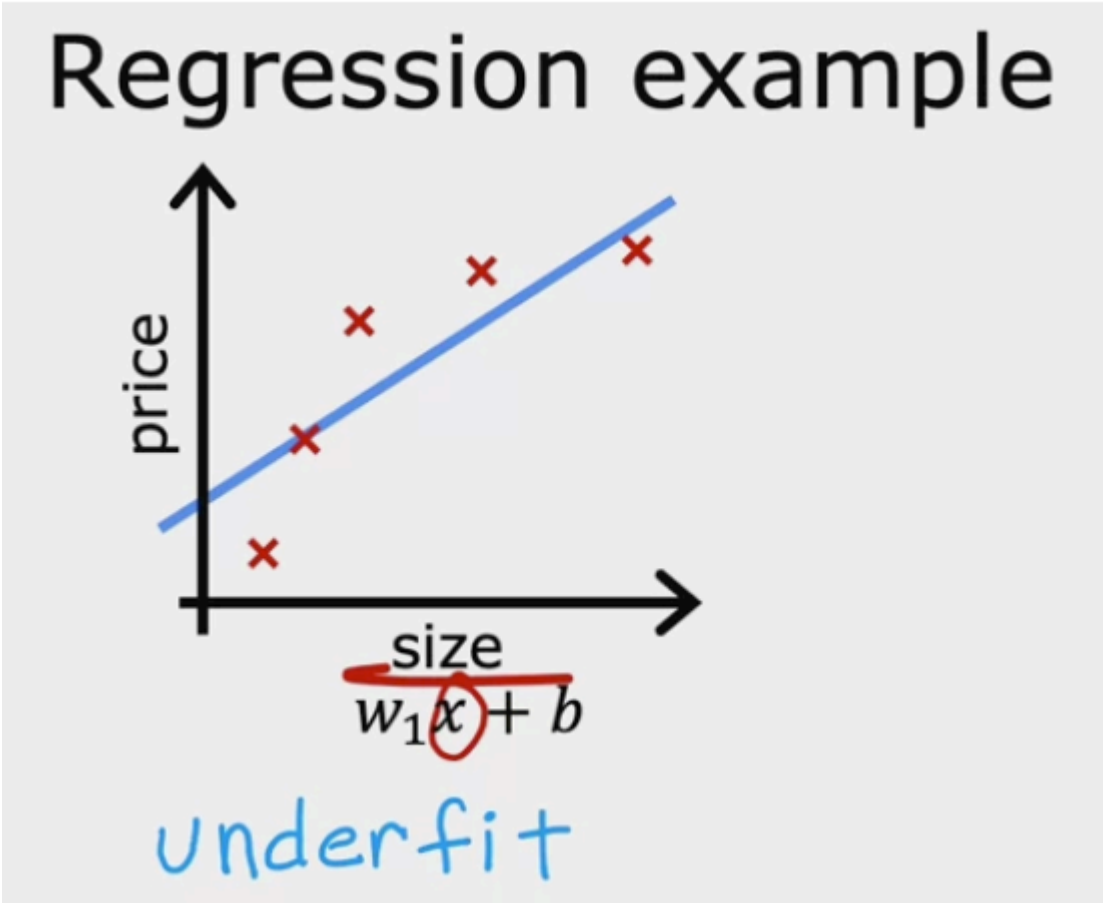
Generalization: fit to data not in train set. well trained.



Overfitting:



Underfitting: not able to fit to the training set.



Too few parameteres: underfit, too many parameters: overfit.

Collect more data.

Feature selection - to prevent overfitting.

Regularization: Reduce the size of the parameters w1,2,3,...
if you can multiply these parameters with large numbers, than they are negligible.

lambda is the value for heaviness of regularization.