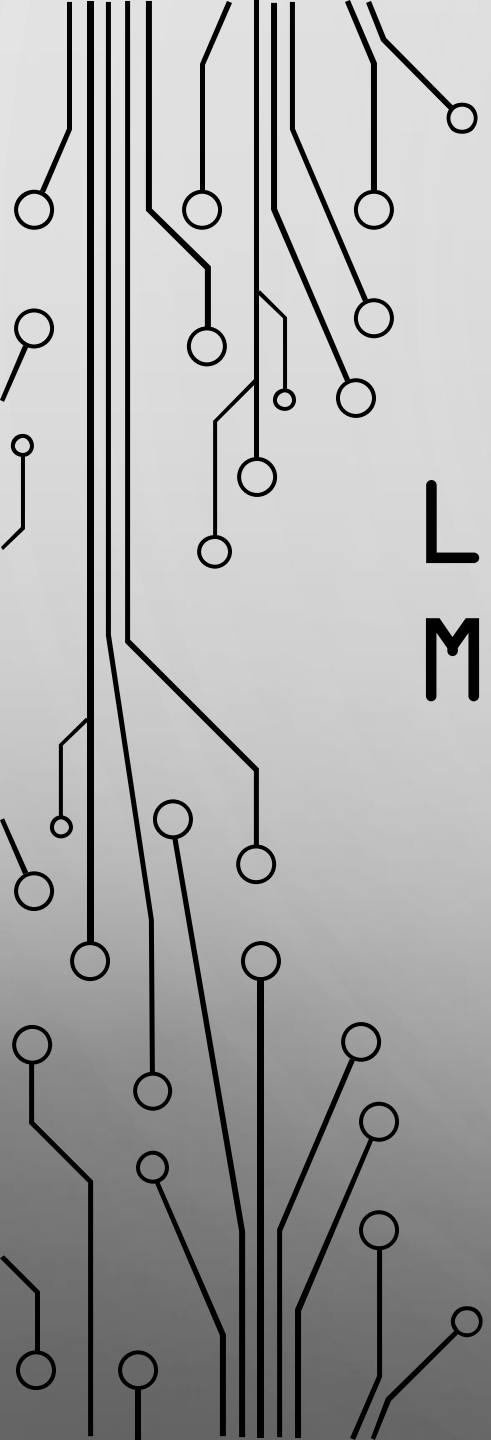


LEARNING MACHINE LEARNING

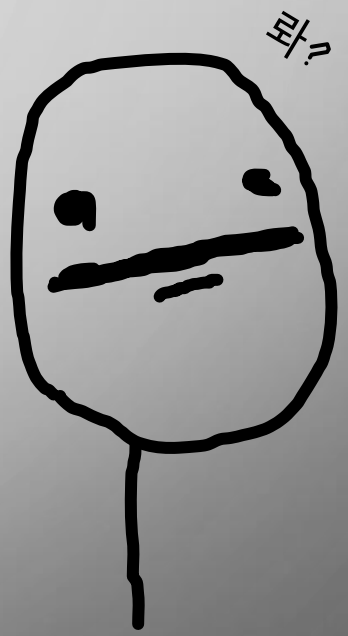
2018-07-12

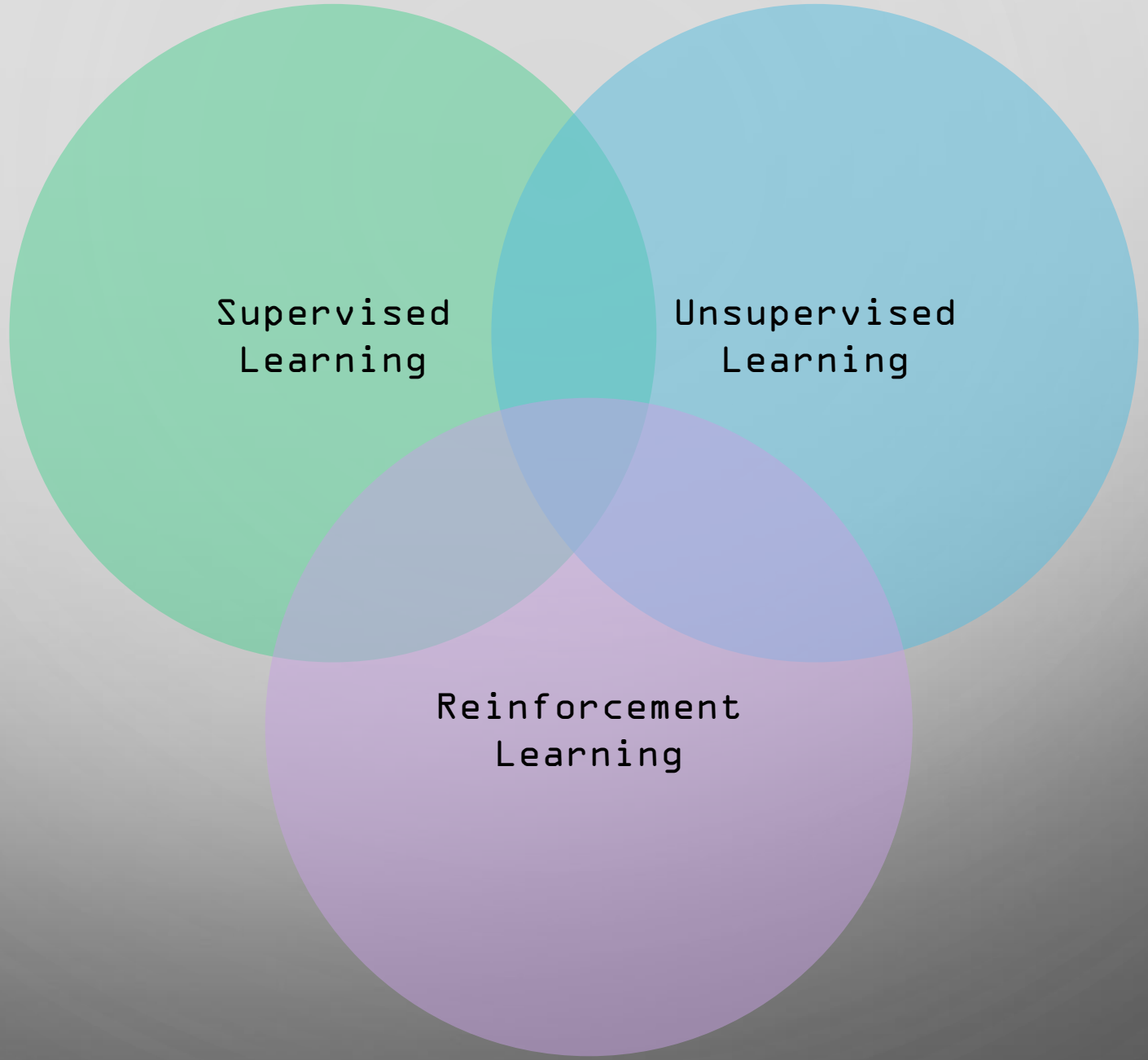
REVLR

TEAM S.C.P

CONTENTS

- review
- Binary classification Model
- sigmoid function
- softmax classification
- softmax classifier's cost function




Supervised Learning
Unsupervised Learning
Reinforcement Learning

SUPERVISED LEARNING MODEL

Logistic (regression) Classification

Binary Classification

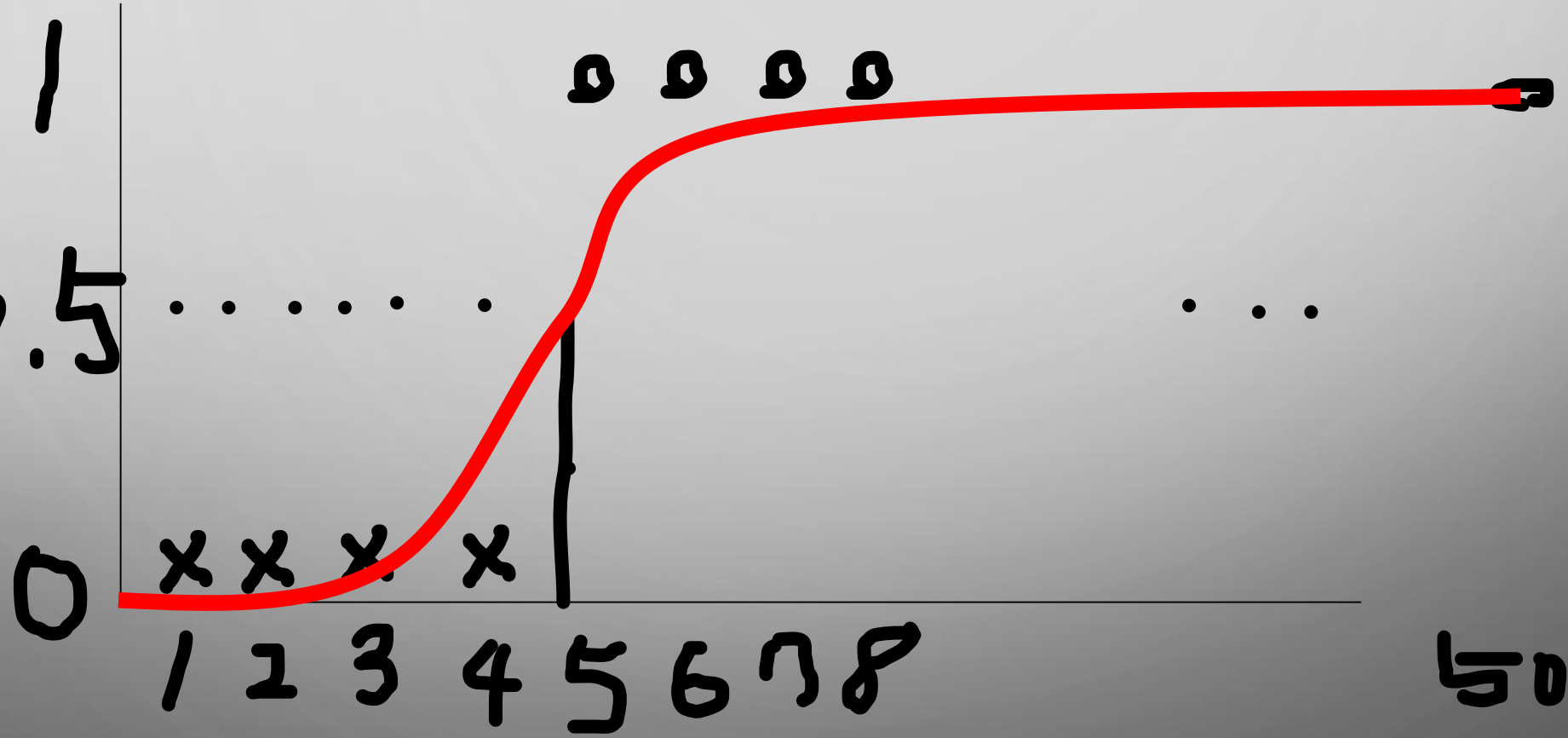
Multi-label Classification

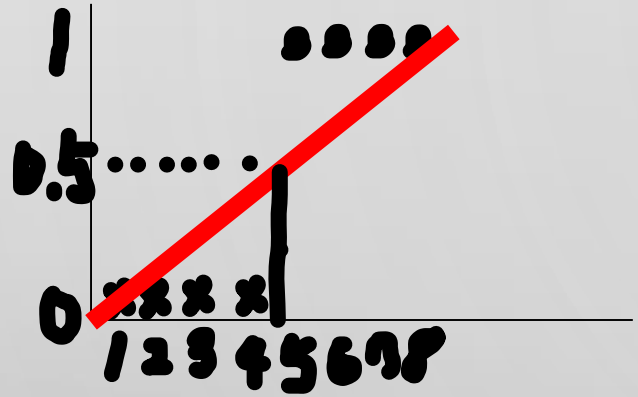
Play time(x1)	Deck power(x2)	Wins(y1)	Legend(y2)	Grade(y3)
10	5	42	1	0
9	5	38	0	2
3	2	7	0	18
2	4	8	0	14
11	1	2	0	25

BINARY CLASSIFICATION MODEL

BINARY CLASSIFICATION MODEL

BINARY CLASSIFICATION MODEL





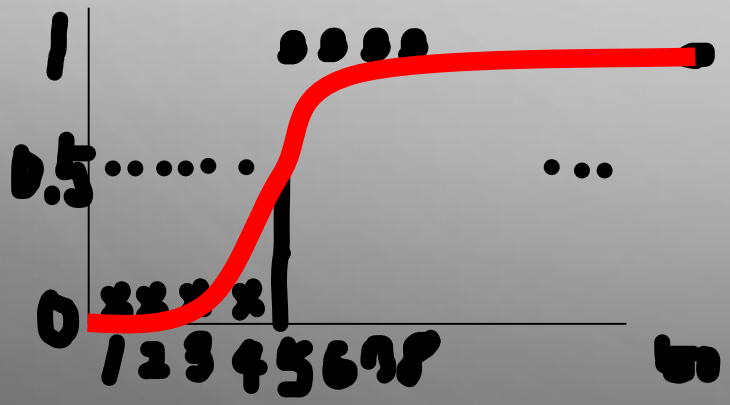
$$H(x) = Wx + b$$

$$H(x) = \frac{1}{10}x \quad (W = \frac{1}{10}, b = 0)$$

$$H(x)_{50} = 5 \qquad (5 \gg 1)$$

$$0 < H(x) < 1 \qquad ???$$

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



Sigmoid Function

$$g(z) = \frac{1}{(1 + e^z)}$$

$$H(X) = \frac{1}{1 + e^{W^t X}}$$

COST FUNCTION

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

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

$$H(X) = \frac{1}{1 + e^{W^t X}}$$

COST FUNCTION

$$H(X) = \frac{1}{1 + e^{W^t X}}$$

$$cost(W) = \frac{1}{m}\sum_{i=1}^{m} c(H(x_i), y_i)$$

$$c(H(x_i), y_i) = \begin{cases} -\log\big(H(x)\big) & : \ y = 1 \\ -\log\big(1 - H(x)\big) & : \ y = 0 \end{cases}$$

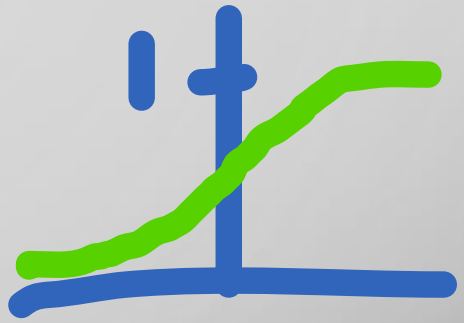
$$cost(W) = -\frac{1}{m}\sum_{i=1}^{m} \{y \log\big(H(x)\big) + (1 - y) \log\big(1 - H(x)\big)\}$$

$$\therefore W \Leftarrow W \ - \ \alpha \frac{\partial}{\partial W} cost(W, b)$$

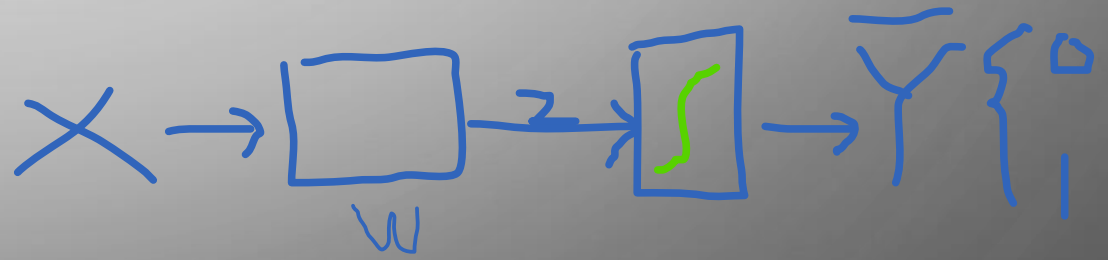
SOFTMAX CLASSIFICATION

$$H_L(x) = Wx$$

$$z = H_L(x), \quad g(z)$$

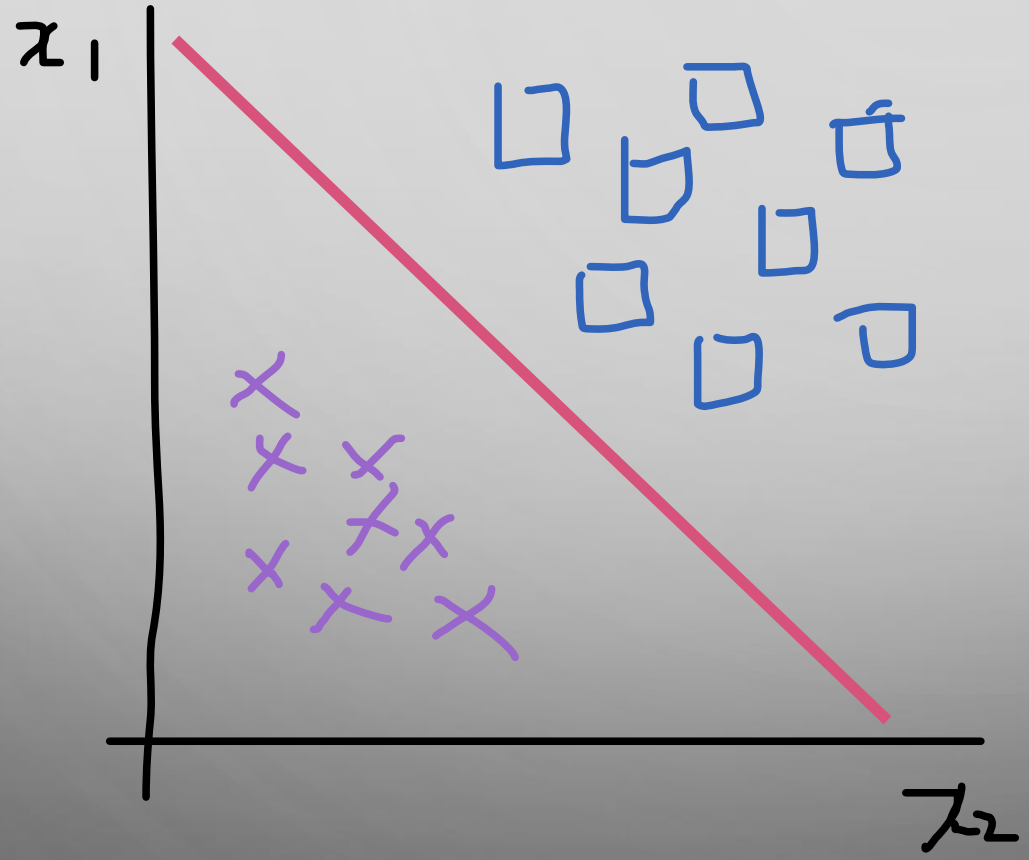


$$g(z) = \frac{1}{1+e^{-z}}$$



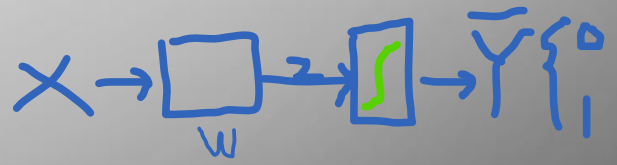
$$H_R(x) = g(H_L(x))$$

SOFTMAX CLASSIFICATION

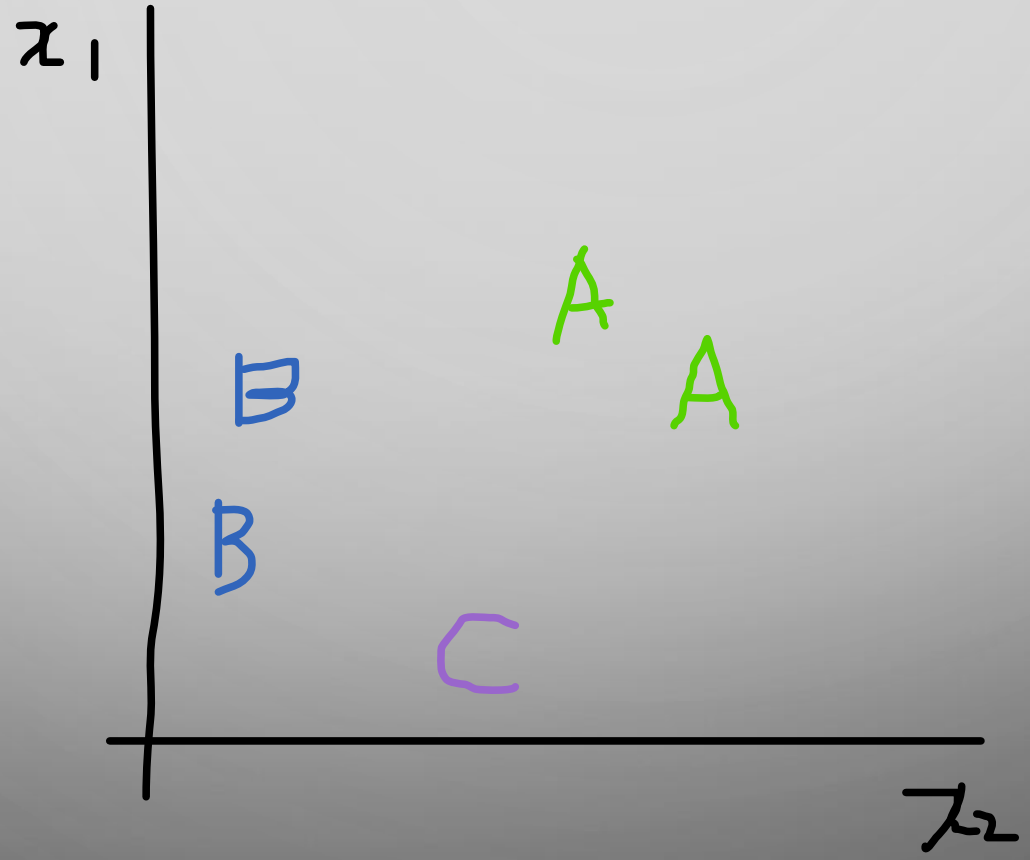


$$g(z) = \frac{1}{1+e^{-z}}$$

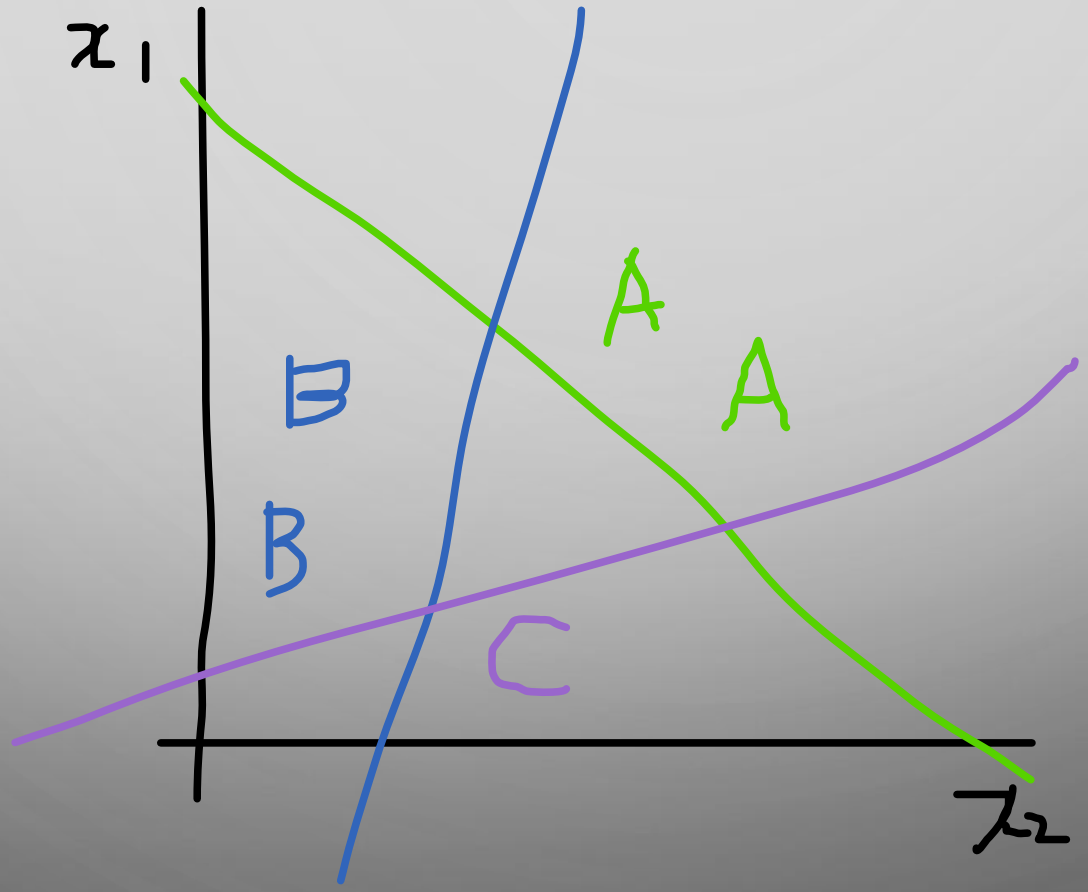
$$H_R(x) = g(H_L(x))$$



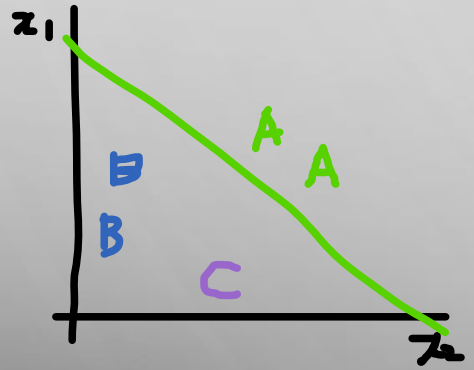
MULTINORMIAL CLASSIFICATION

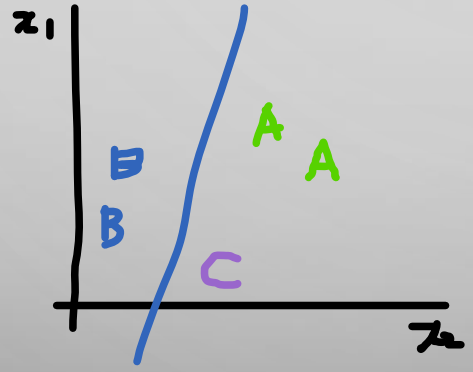


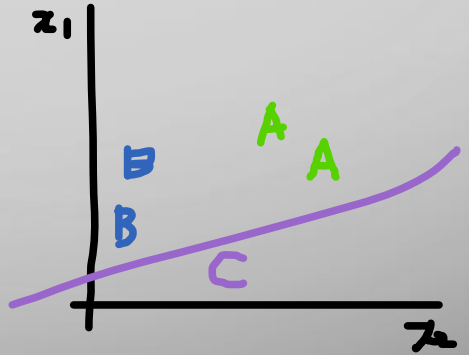
MULTINORMIAL CLASSIFICATION

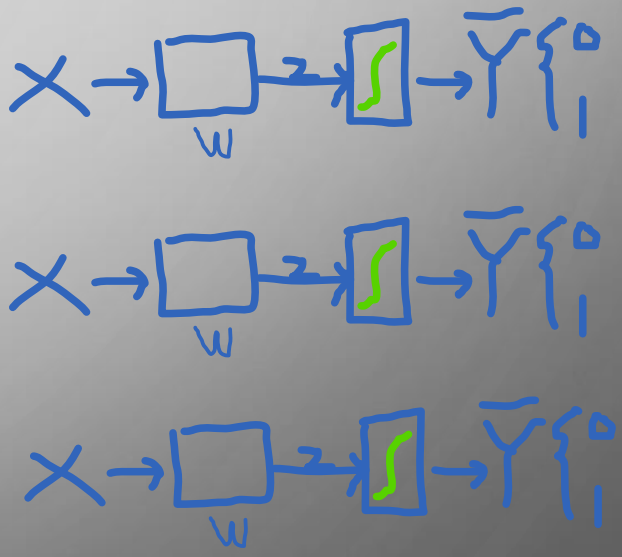


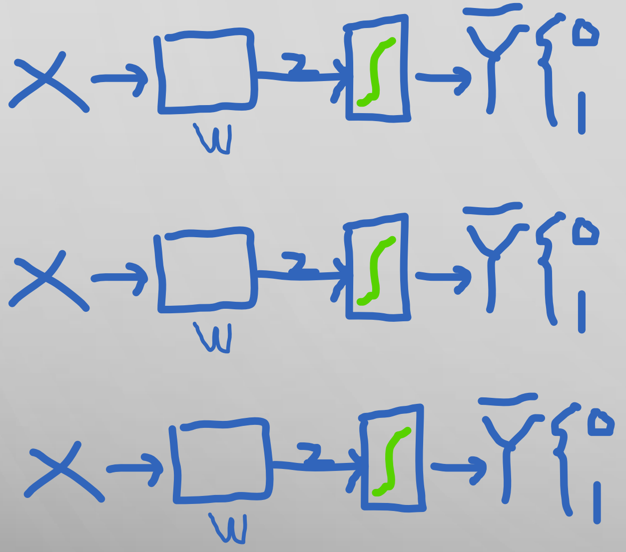
MULTINORMIAL CLASSIFICATION







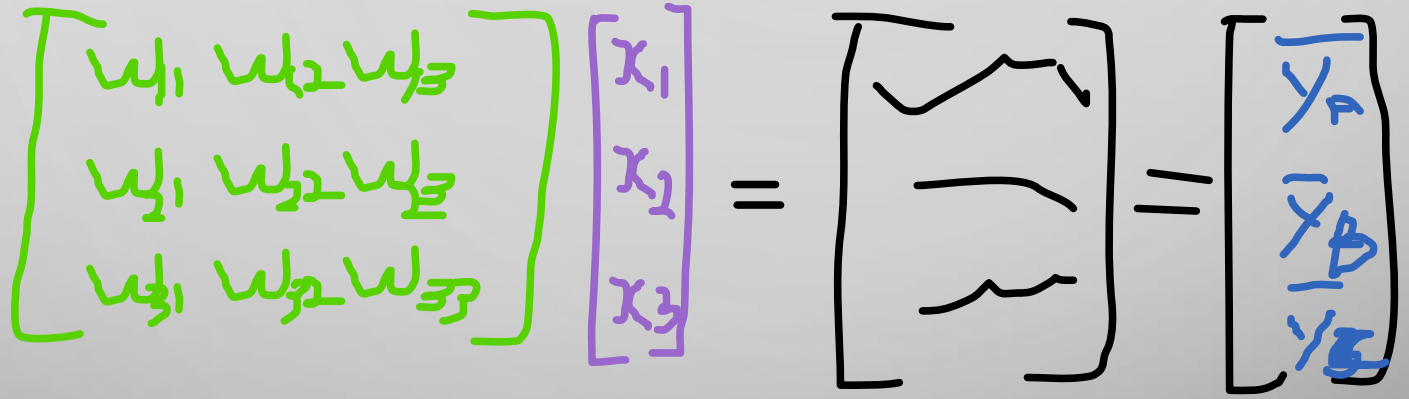


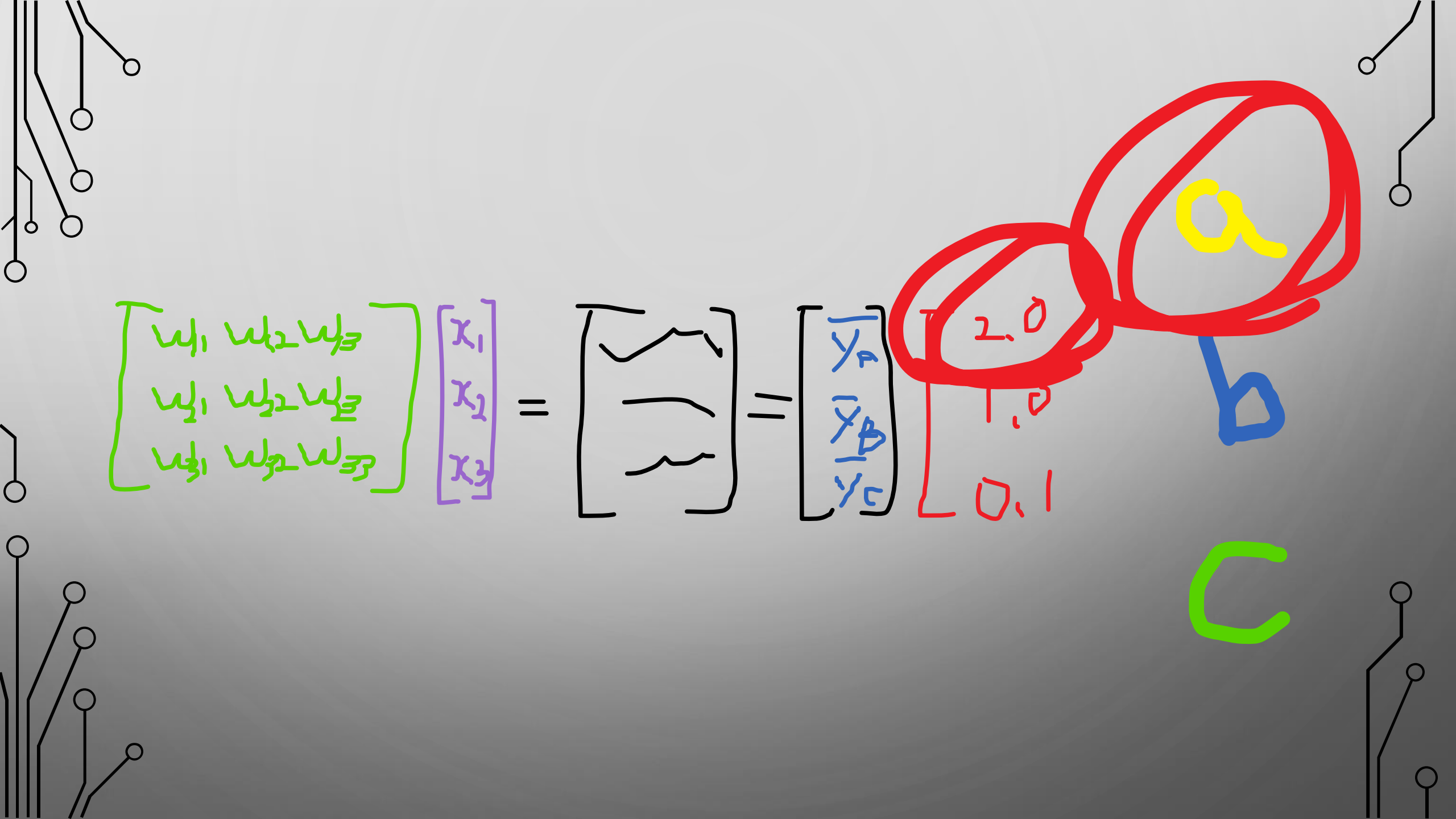


$$[w_1\ w_2\ w_3]\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix} = [w_1x_1 + w_2x_2 + w_3x_3]$$

$$[w_1\ w_2\ w_3]\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix} = [w_1x_1 + w_2x_2 + w_3x_3]$$

$$[w_1\ w_2\ w_3]\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix} = [w_1x_1 + w_2x_2 + w_3x_3]$$



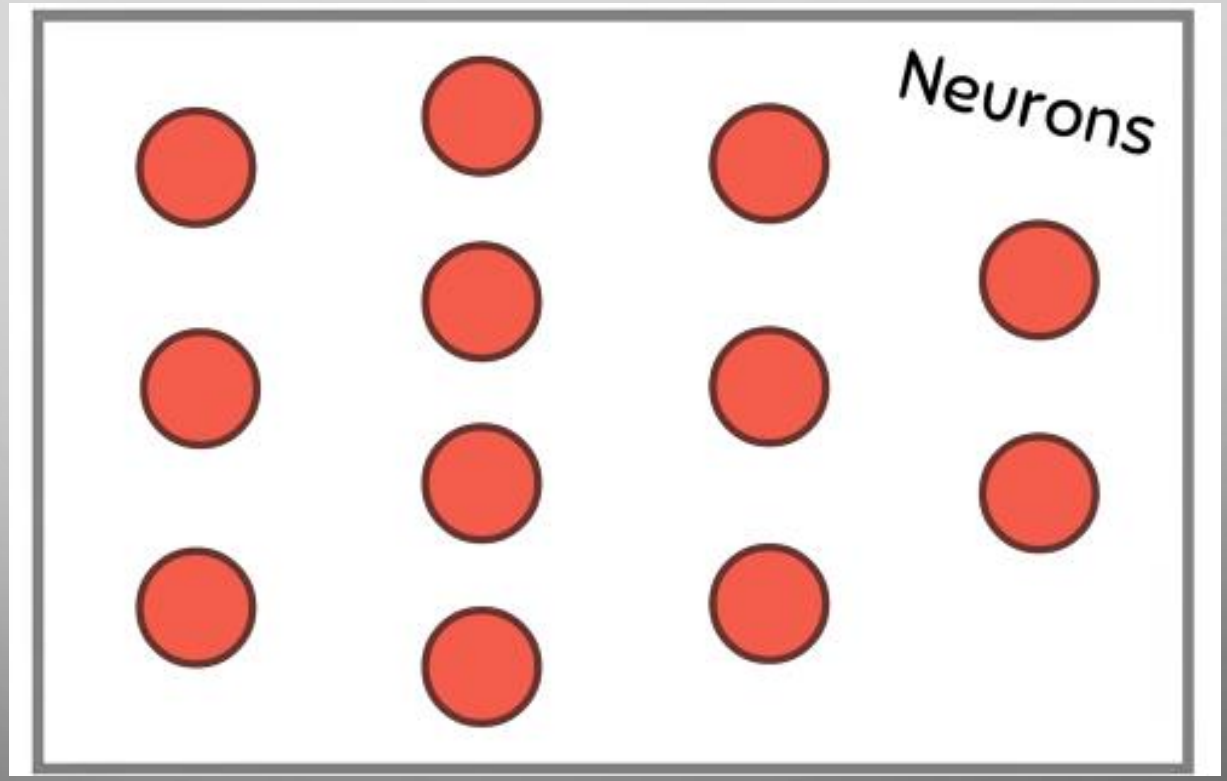

2.0
1.0
0.1
a
b
c

0.7 → 1

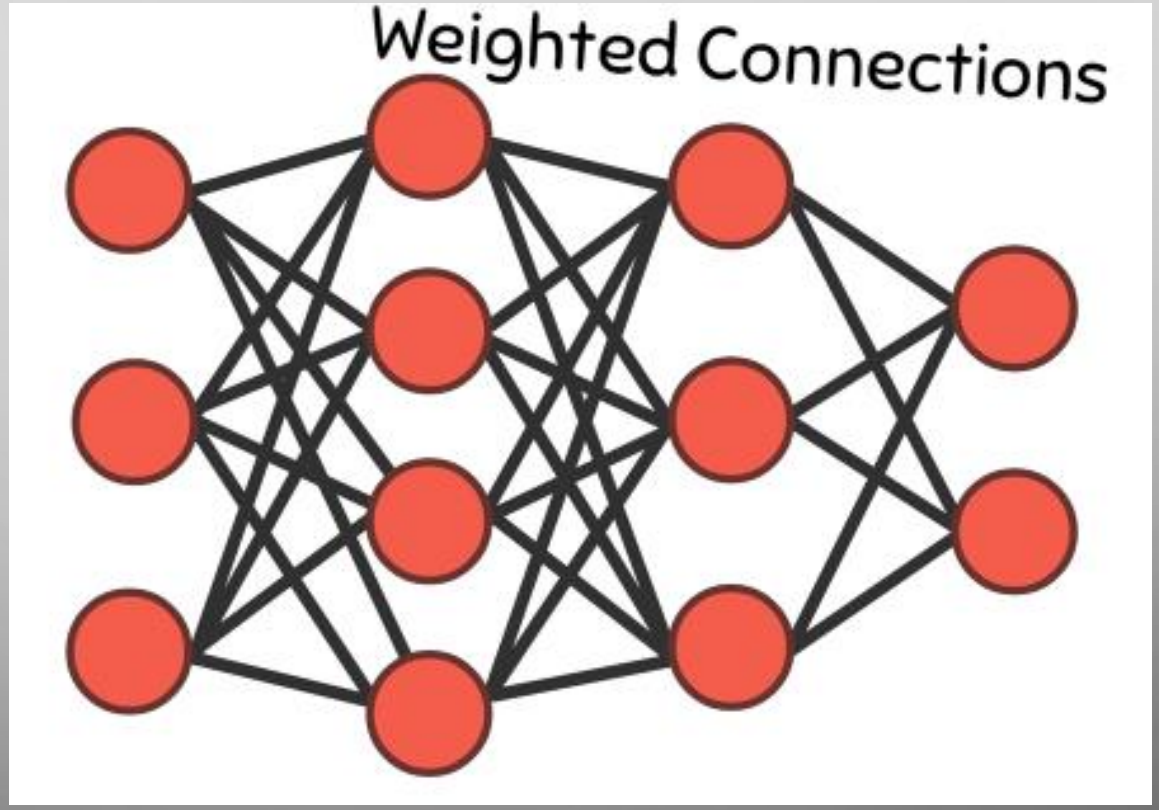
$$y \begin{bmatrix} 2.0 \\ 1.0 \\ 0.1 \end{bmatrix} \xrightarrow{s(y)} \begin{matrix} 0.2 \\ 0.1 \end{matrix} \rightarrow \begin{matrix} 0 \\ 0 \end{matrix}$$

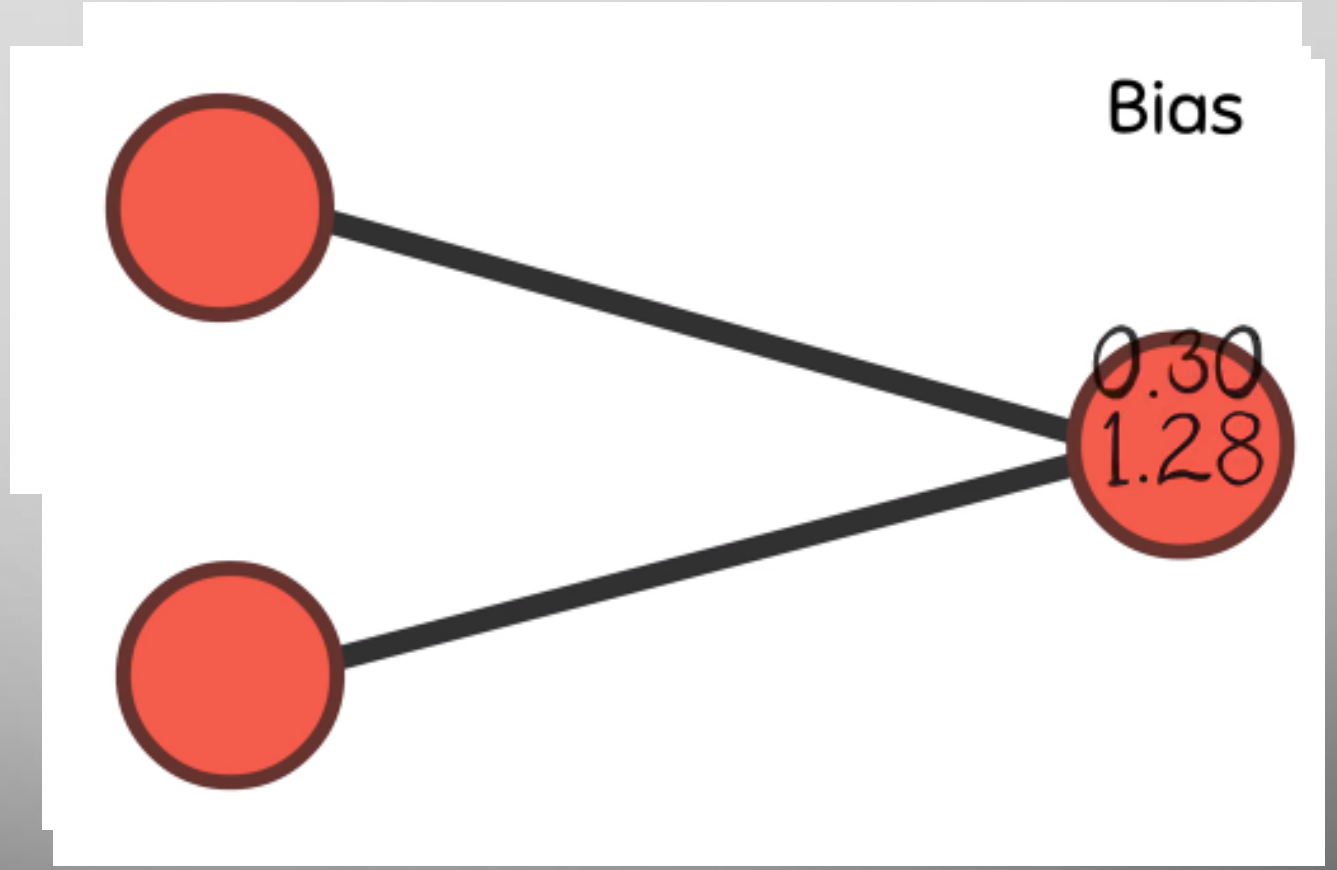
c

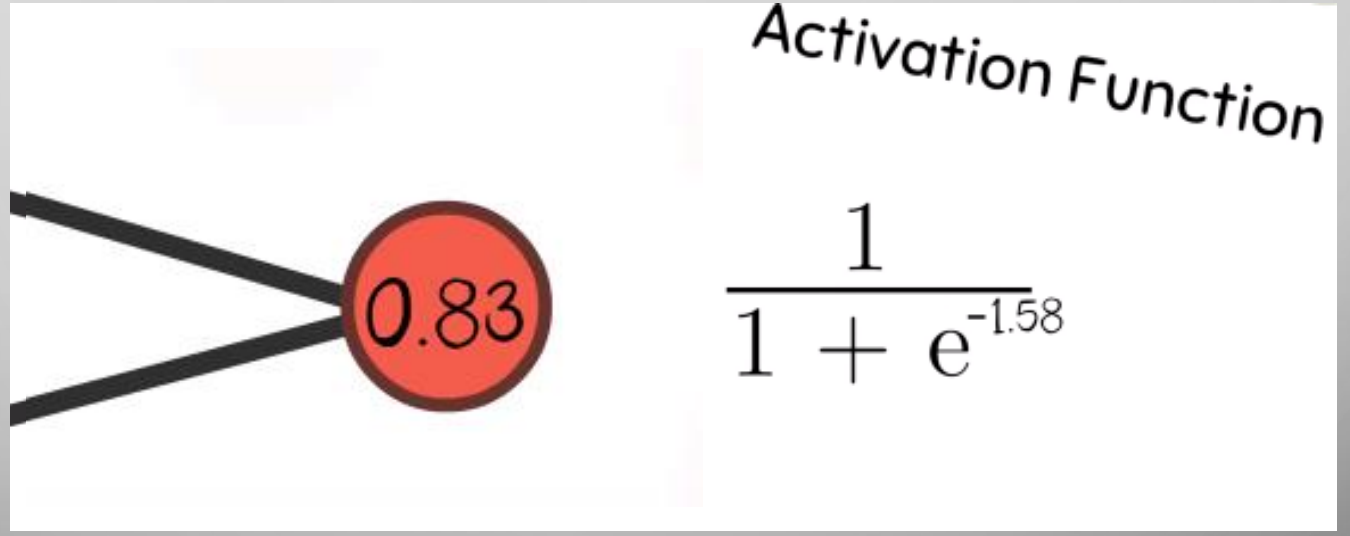
NURAL NETWORK



NURAL NETWORK




Bias
0.30
1.28


Activation Function
0.83
$\frac{1}{1 + e^{-1.58}}$