

Neural Networks & Logic Gates:

↳ Exploring the need for deeper networks!!!

Deep:



↳ Generally Non Linear in nature. System.

↳ why? ↳ a) Activation fun.
↳ b) Bias.

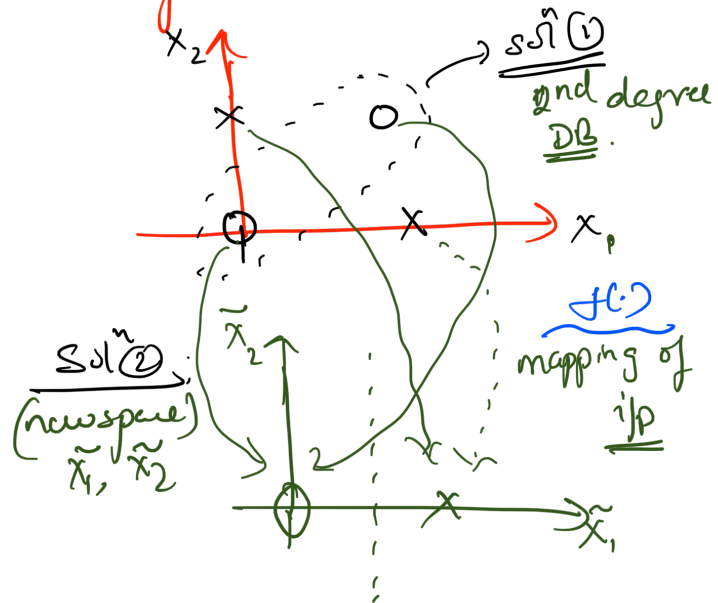
b) Bias \Rightarrow $y = mx + c$

a) AFns \Rightarrow

↳ transform i/p (as)
 ↳ map i/p to o/p
 ↳ makes unbounded i/p \rightarrow bounded o/p

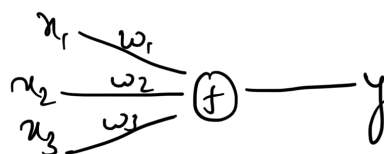
why are these introduced?

↳ Eg: XOR



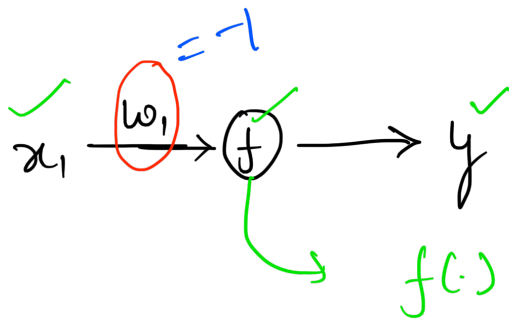
Neuron:
(say)

$$y = f(\underline{wx}) = f(x_1 w_1 + x_2 w_2 + x_3 w_3 + b)$$



0 \Rightarrow -ve class (1)
 1 \Rightarrow +ve class (2)

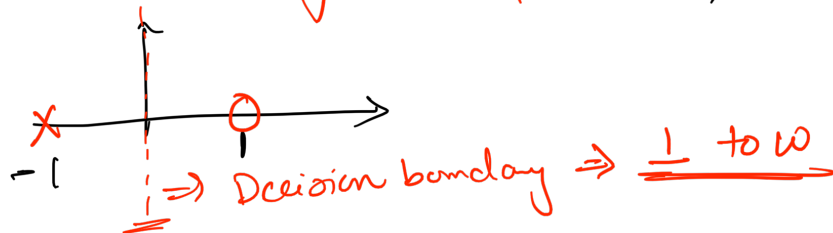
Problem 1: NOT Gate:



x_1	y
1	-1
-1	1

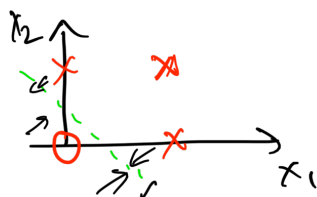
Can we build a not for two?

How to find w_1 ? \Rightarrow

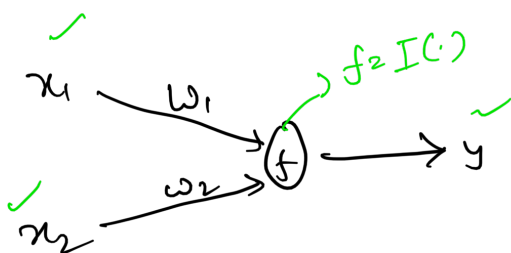


$$\begin{aligned} -1 &= w_1(1) \Rightarrow w_1 = -1 \\ 1 &= w_1(-1) \Rightarrow -w_1 = 1 \\ \boxed{w_1 &\Rightarrow -1} \end{aligned}$$

Problem: OR Gate:



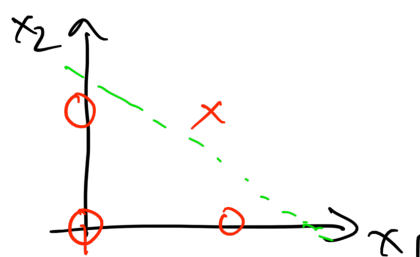
x_1	x_2	y
0	0	0
0	1	1
1	0	1
1	1	1



$$y = x_1 w_1 + x_2 w_2$$

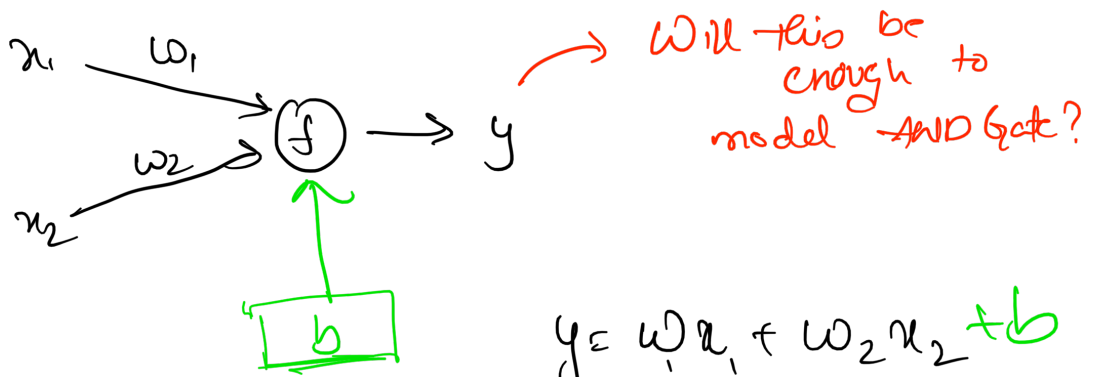
\Rightarrow What happened to intercept? (xw?)

Problem: (3) AND Gate:



x_1	x_2	y
0	0	0
0	1	0
1	0	0
1	1	1

Solⁿ (1):



Will this be enough to model AND gate?

$$\underline{y = w_1 x_1 + w_2 x_2 + b}$$