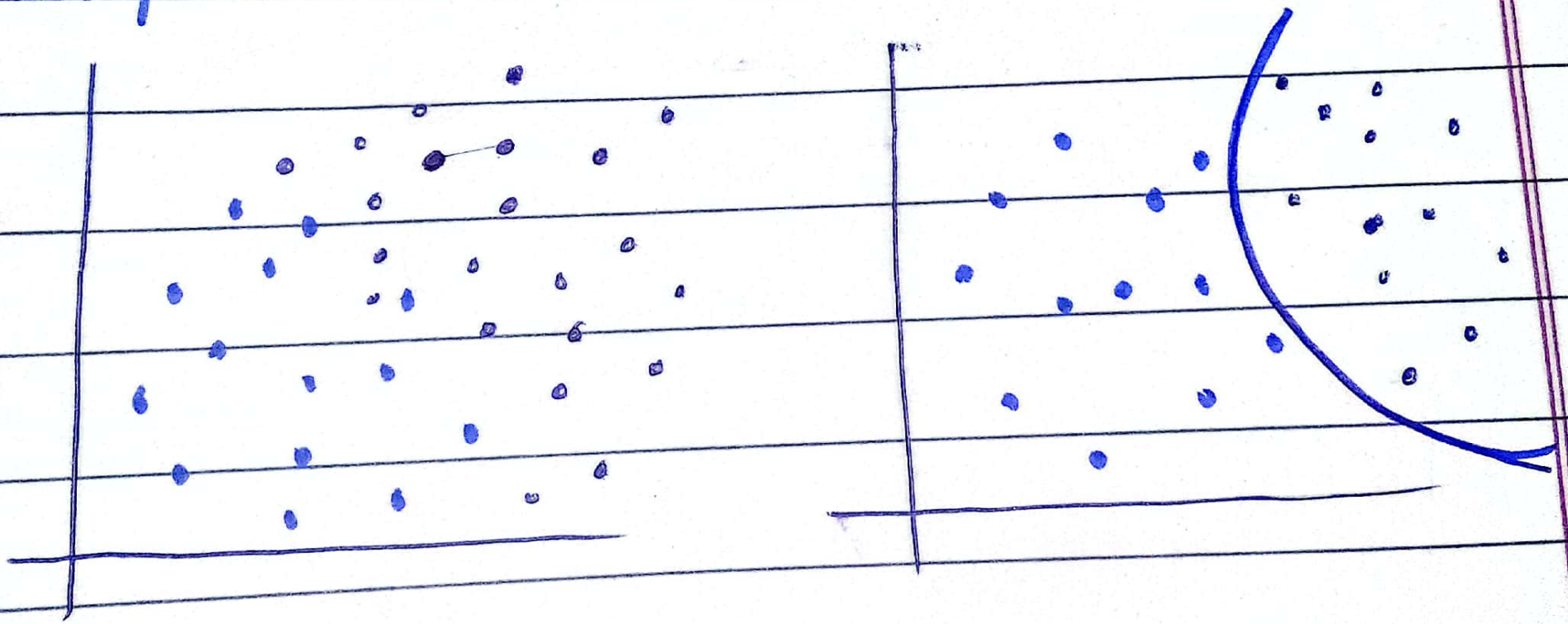
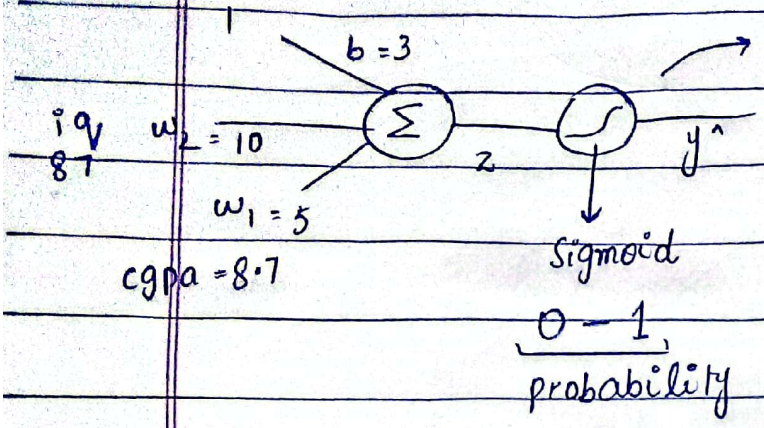
Multi-layer perceptron | MLP Intuition:

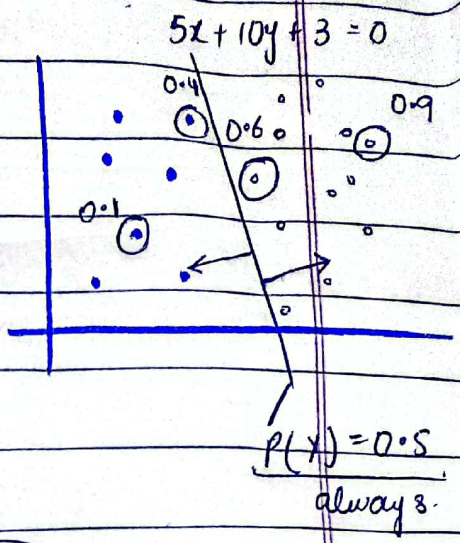
Perceptron: problem → not handle non-linear data.



Day: Date:

Perceptron with Sigmoid:





$w_1 cgpa + w_2 iq + b$

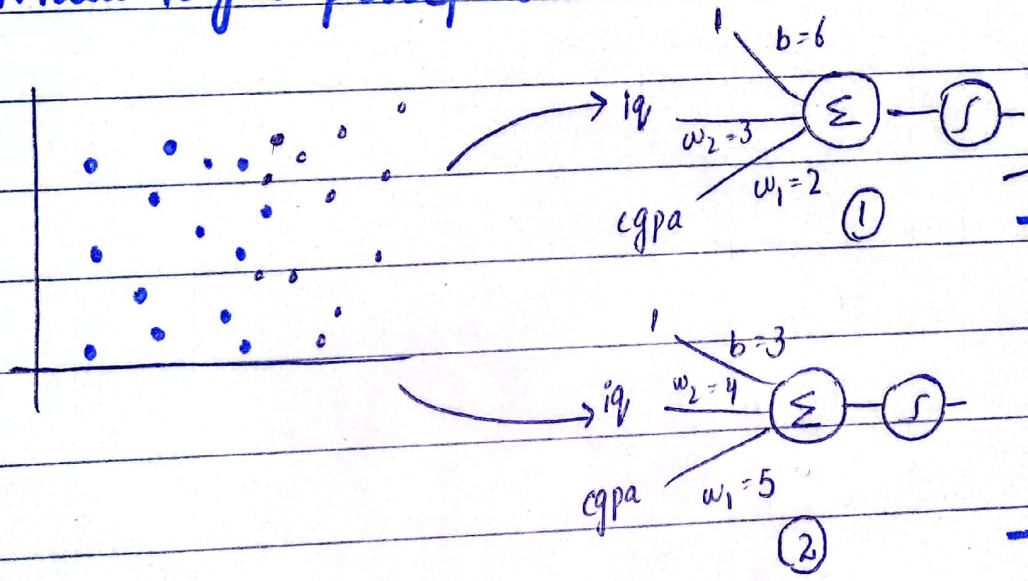
$5 \times 8.7 + 10 \times 87 + 3 = z \longrightarrow \frac{1}{1+e^{-z}} = 0-1$ probability

sigmoid

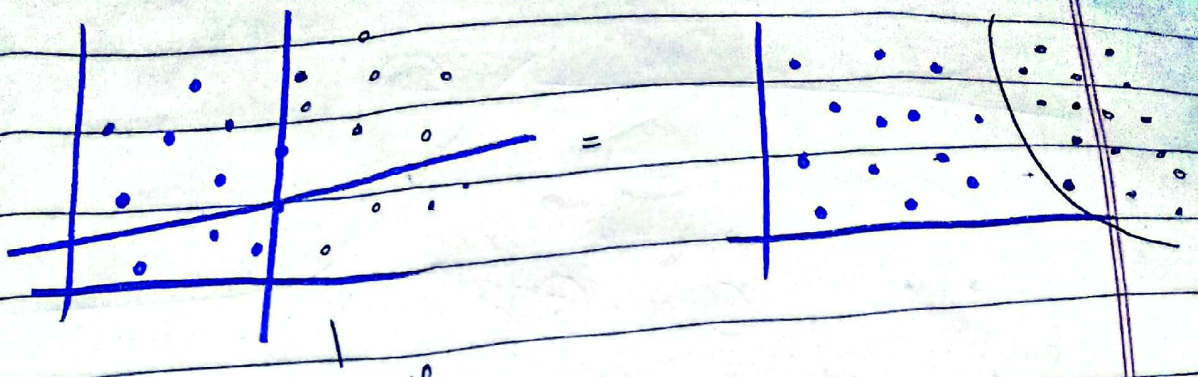
$P(Y) = 0.8$

$P(N) = 0.2$

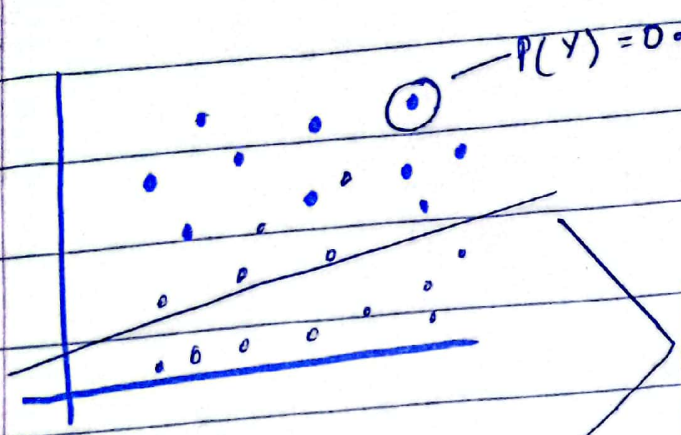
Multi-layer perceptron idea:



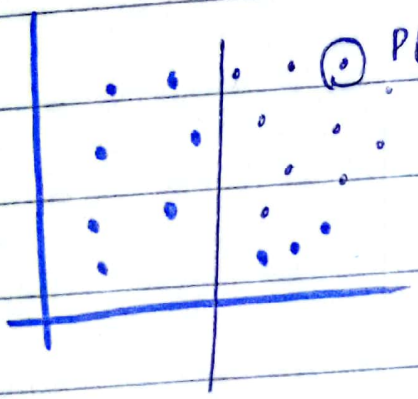
Day: Date:

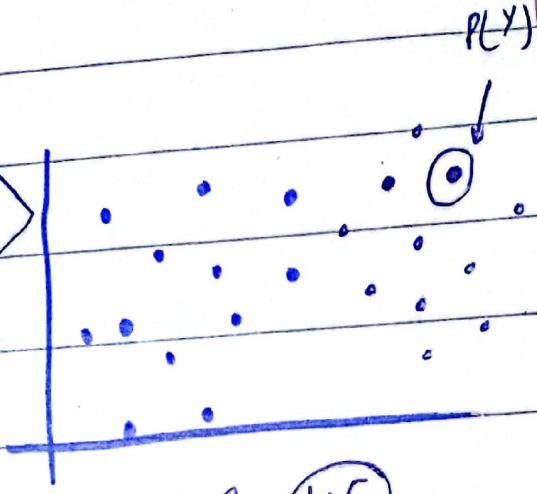


Smooth



+





0.7 + 0.8 = 1.5 problem.

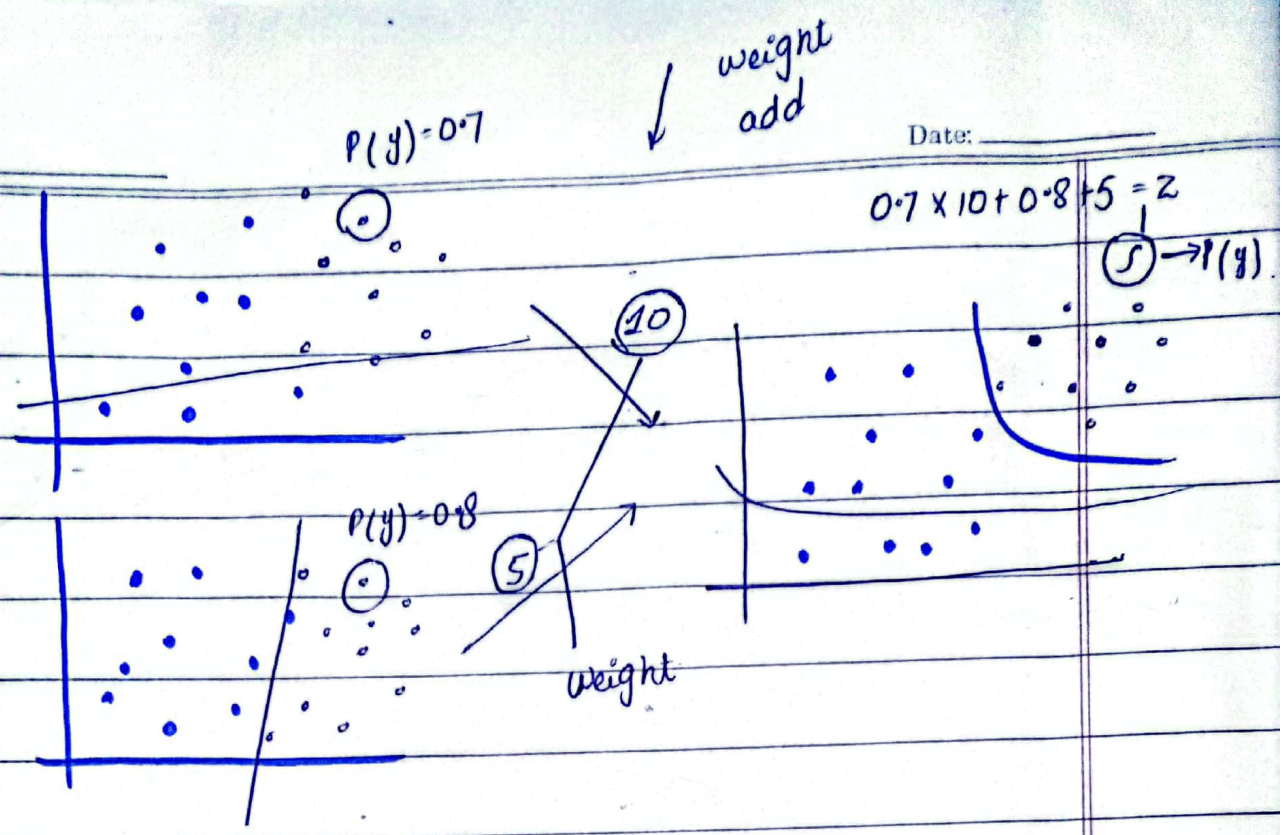
1.5 probability X

$$\sigma(z) = \frac{1}{1+e^{-z}} = \frac{1}{1+e^{-1.5}} = 0.82$$

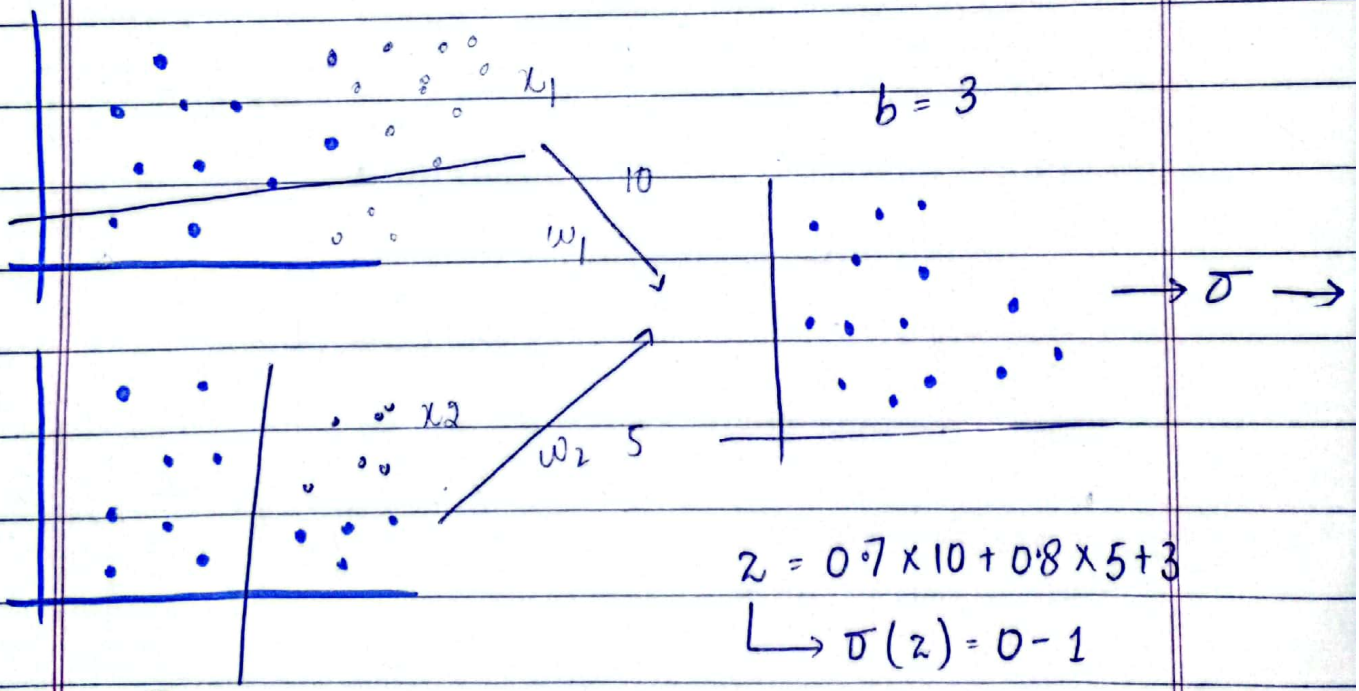
linear Combination of two perceptron

One Perceptron dominates more than other:

Day: _____ Date: _____

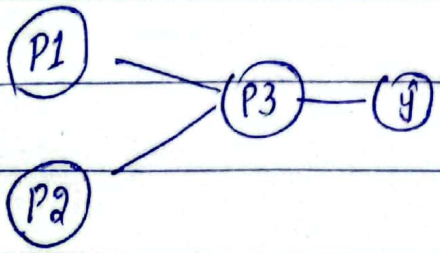


We also add bias :

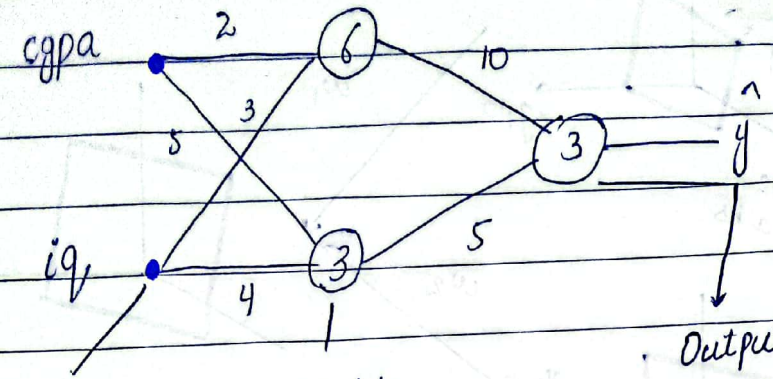


$z = 0.7 \times 10 + 0.8 \times 5 + 3$

$\hookrightarrow \sigma(z) = 0-1$



Date: Day:



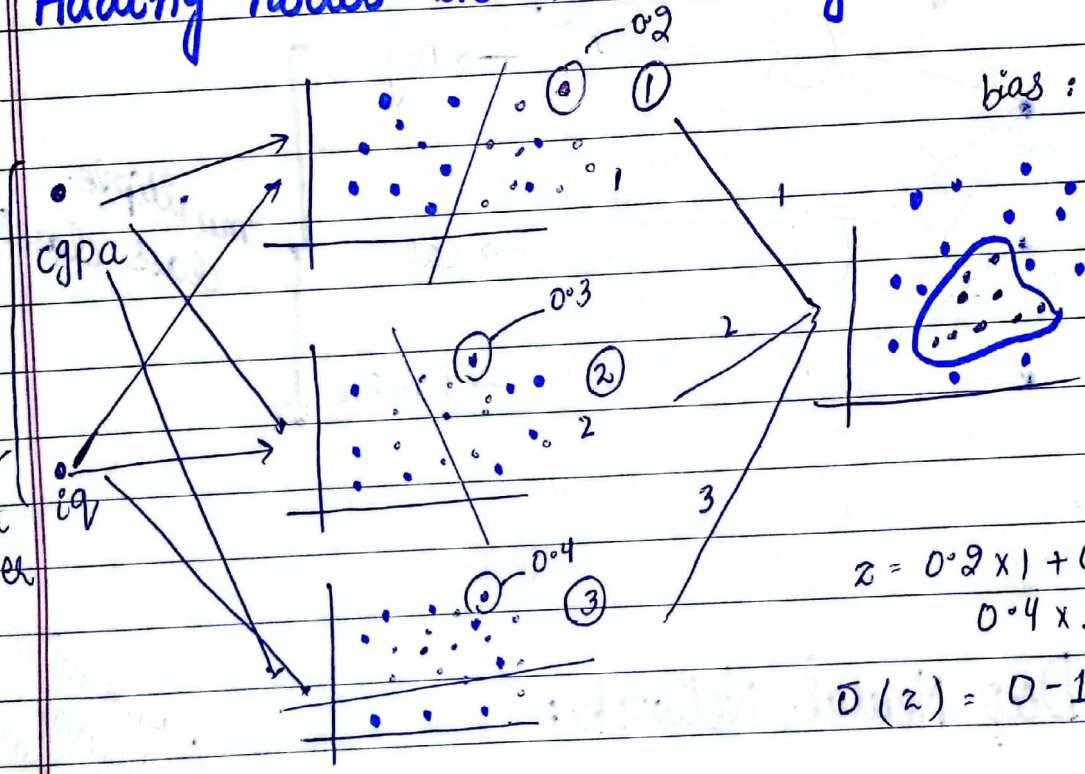
Multiple layer perceptron

linear combination

↓

multiple perception

Adding nodes in hidden layer:



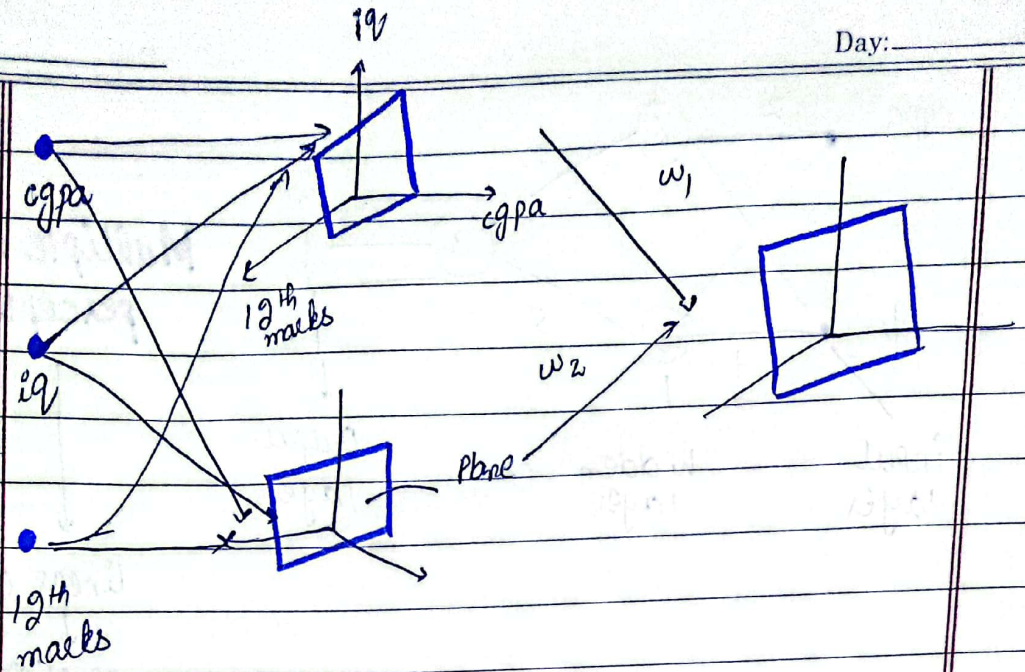
$z = 0.2 \times 1 + 0.3 \times 2 + 0.4 \times 3 + 1.0$

$\sigma(z) = 0.1$

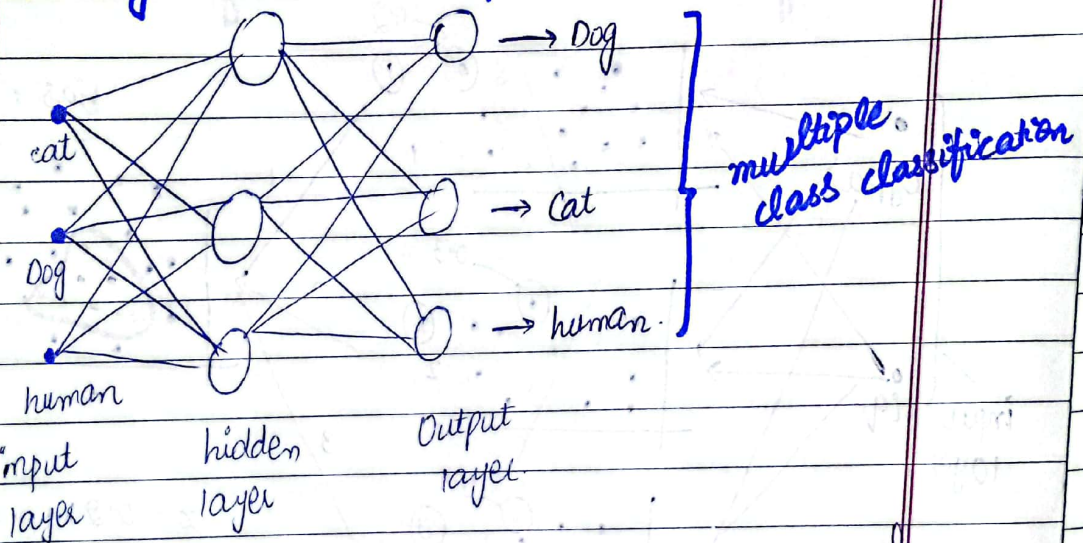
Nodes ↑ ⟶ Non-linearity (better)

Adding nodes in input:

Date: Day:



Adding nodes in output node:



Deep Neural Network:

universal function approximator