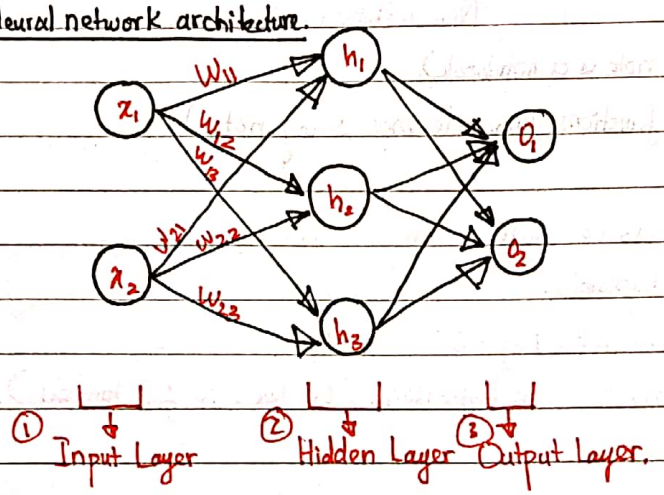
THEME Date

Neural Network Explained :

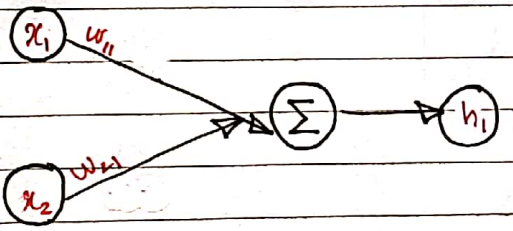
Neural network architecture.



→ Neural Network is a combination of linear layers stacked onto each other.

→ Why so many layers ?
↳ Because the more layers we have, we hope to gain some high-level features that a normal linear model cannot learn.

Forward propagation.



→ Every connection represents a multiplication operation. When the connections meet at the output node, the multiplication outputs get summed up to create the output.

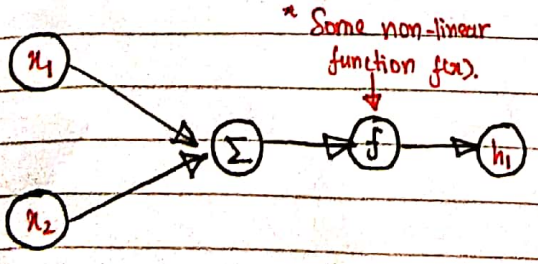
$$\Rightarrow \boxed{h_1 = x_1 w_{11} + x_2 w_{21}}$$

→ In linear algebra, this can be presented as a matrix multiplication :

$$\begin{bmatrix} x_1 & x_2 \end{bmatrix} \cdot \begin{bmatrix} w_{11} & w_{12} & w_{13} \\ w_{21} & w_{22} & w_{23} \end{bmatrix} = \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix}$$

$$\begin{cases} h_1 = x_1 w_{11} + x_2 w_{21} \\ h_2 = x_1 w_{12} + x_2 w_{22} \\ h_3 = x_1 w_{13} + x_2 w_{23} \end{cases} \#$$

Activation



→ Non-linearity is what we want the neural network to learn.

→ Activation induces non-linearity.

→ Activation function is applied after summation.

↳ Some common activation functions :
- Rectified Linear Unit (ReLU)
- Sigmoid
- Tanh.