Perceptron and Multi-Layer Perceptron (MLP)

# What is a Perceptron?

A Perceptron is the simplest type of Artificial Neural Network – basically a mathematical model of a single neuron. It was introduced by Frank Rosenblatt in 1958.

# Working of a Perceptron

1. Takes inputs (x1, x2, …, xn).

2. Each input is multiplied by a weight (w1, w2, …, wn).

3. A weighted sum is calculated and a bias (b) is added:

z = Σ (wi \* xi) + b

4. The result (z) is passed through an activation function (like a step function):

f(z) = 1 if z ≥ 0, else 0

This makes it a binary classifier (output is 0 or 1).

# Example

If we train a perceptron to recognize whether an input number is positive or negative, it can output:  
- 1 → Positive  
- 0 → Negative

# Perceptron vs Multi-Layer Perceptron (MLP)

Perceptron:

- Only 1 layer (input → output).

- Can only solve simple linear problems (like AND, OR).

MLP (Multi-Layer Perceptron):

- Has multiple hidden layers.

- Can solve complex, non-linear problems (like digit recognition, image classification, NLP).

# Conclusion

In short:  
- Perceptron = single artificial neuron.  
- MLP = a network of many perceptrons arranged in layers.