<u>Task 1</u>: Implementing an AND gate using Logistic Regression

As all of you are familiar with the basic working of the AND gate.

An ***AND gate*** is a fundamental building block in digital logic design. It takes two binary inputs and produces a binary output. The output is **1** only when both inputs are **1**, otherwise, the output is **0**.

For example:

The truth table for an AND gate is as follows:

Input A	**Input B**	**Output**
0	0	0
0	1	0
1	0	0
1	1	1

Task Requirements:
You need to implement AND Gate Functionality using Logistic regression.

Note:
To create a logistic regression model for an AND gate, start by defining the input features (Input) and the target variable (Output). Load the dataset representing the AND gate truth table and fit the logistic regression model using these inputs and target. Train the model to ensure it correctly learns the relationship between the inputs and the output. Once trained, predict the output for all possible combinations of Inputs, and compare these predicted outputs with the actual outputs from the truth table to verify accuracy. Print the model's coefficients and intercept to understand the learned parameters.

(Optional) Additionally, create a plot to visualize the decision boundary established by the logistic regression model, providing a graphical representation of how the model separates the input space based on the learned relationship.

Objective of given task:
The objective of this assignment is to understand the implementation of a basic AND gate using logistic regression. You will learn how to model a simple logical function using a machine learning algorithm and grasp the underlying concepts of logistic regression.

Task 2: Implementing an OR gate using Logistic Regression

As all of you are familiar with the basic working of the OR gate.

An ***OR gate*** is a fundamental building block in digital logic design. It takes two binary inputs and produces a binary output. The output is **1** if at least one of the inputs is **1**, otherwise, the output is **0**.

For Example:

The truth table for an OR gate is as follows:

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	1

Task Requirements:
You need to implement OR Gate Functionality using Logistic regression.

Note:
To create a logistic regression model for an OR gate, start by defining the input features (Input) and the target variable (Output). Load the dataset representing the OR gate truth table and fit the logistic regression model using these inputs and target. Train the model to ensure it correctly learns the relationship between the inputs and the output. Once trained, predict the output for all possible combinations of Inputs, and compare these predicted outputs with the actual outputs from the truth table to verify accuracy. Print the model's coefficients and intercept to understand the learned parameters.

(Optional) Additionally, create a plot to visualize the decision boundary established by the logistic regression model, providing a graphical representation of how the model separates the input space based on the learned relationship.

Objective of given task:

The objective of this assignment is to understand the implementation of a basic OR gate using logistic regression. You will learn how to model a simple logical function using a machine learning algorithm and grasp the underlying concepts of logistic regression.