**SECTION -1**

***Answer-1***

This diagram illustrates a basic neural network's function for binary classification, showcasing the relationship between inputs, weights, an activation function, and output.

Notations:

Inputs x1 and x2

* These are the input features to the model. For example, in a classification problem, these could be measurements such as height and weight for classifying an individual as either "underweight" or "normal".

Weights w

Weights are the parameters which are given to the model that can be adjusted during training. Each input feature x1x\_1x1​ and x2x\_2x2​ is multiplied by its corresponding weight, which determines the importance of that feature in the overall model

Step Function

step function is a thresholding function that outputs one value if the weighted sum of inputs exceeds a certain threshold and another value otherwise. In binary classification, this often translates to outputting a 1 (indicating one class) or a 0 (indicating another class).

Output y

The output yyy represents the result of the classification. In this case, it appears to show a decision boundary in the output space, where different regions are marked with different colors (blue and pink). This indicates the two classes that the model is trying to differentiate between. The points (likely representing training data) are shown within the decision boundary, with different colors indicating the predicted class.

The overall process demonstrates how the model uses input features to learn a decision boundary that can classify new data points into one of the two classes.

***Answer-2***

Output of code is:

[1]

[1 , 2]

[3]

***Answer-3***

B) lambda x: x \* 2

***Answer-4***

The x-axis represents the model complexity, while the y-axis likely represents the error rate (or accuracy) on the training and testing datasets.

There are two curves:

Train curve (in cyan): This represents the model's performance on the training data. As model complexity increases, the training error decreases steadily. However, at some point, the model may overfit the training data, causing the error on the test data to rise.

Test curve (in orange): This represents the model's performance on the test data (or unseen data). Initially, as model complexity increases, the test error decreases as the model better captures the patterns in the data. However, after a certain point, the model starts to overfit the training data, leading to increased test error.

Underfitting (high bias): On the left side of the graph, when the model complexity is low, both training and test errors are high. The model is too simple and cannot capture the underlying patterns in the data (high bias).

Optimal complexity: In the middle, there is a sweet spot where the model performs well on both training and test data, achieving the lowest error rate on the test set.

Overfitting (high variance): On the right side, the training error remains low, but the test error increases significantly as the model becomes too complex and starts to overfit the noise or details in the training data.

Thus a model that is too simple will underfit (high bias), while a model that is too complex will overfit (high variance). The goal is to find a balance between these two extremes .

***Answer-5***

A) Initializes all variables in a class