Neural Network Assignment

# Part 1: Understanding Neural Networks

1. What is a Neural Network?

In your own words, describe what a neural network is and how it is used in machine learning.

2. What are Neurons in Neural Networks?

Explain what neurons are in the context of neural networks and how they are used to process information.

3. What is an Activation Function?

Define what an activation function is and explain why it is important in a neural network.

4. What is Backpropagation?

Describe the backpropagation process in neural networks and explain why it is used for training models.

5. What are Layers in Neural Networks?

Discuss the different types of layers in a neural network (input, hidden, and output) and their purpose.

6. What is the Role of Weights and Biases in Neural Networks?

Explain what weights and biases are, and how they affect the output of a neural network.

7. What is Overfitting in Neural Networks?

Define overfitting in the context of neural networks and explain how it can be prevented.

# Part 2: Activation Functions

Task:

Choose an activation function that was not explained in class (examples: Leaky ReLU, ELU, Swish, etc.). Write a detailed explanation of the function including the following:

1. Mathematical Formula:

Provide the formula for the activation function.

2. Behavior of the Activation Function:

Describe how the function behaves, i.e., how it transforms input values to output values. Include any specific characteristics like non-linearity, thresholding, etc.

3. Where and Why It's Used:

Explain why this activation function is useful and where it can be applied in a neural network architecture. For example, when is it better than other activation functions like Sigmoid or Tanh?

4. Advantages and Disadvantages:

Discuss the advantages and disadvantages of this activation function compared to others.

5. Real-World Application:

Provide an example of how this activation function might be used in a real-world machine learning problem.