Sheet 3
Perceptrons

Questions

1. What is a perceptron?
2. List the activation function used in perceptron and the diffrences between them?
3. How is the output of a perceptron computed?
4. What is the role of a loss function in the training of a perceptron?
5. Define mean squared error (MSE) loss function.
6. How can you adjust the weights of a perceptron during training ?
7. Why do we apply $sign()$ function on the pereceptron output
8. What is the use of Bias ?
9. How to update Bias ?
10. Design one layer perceptron to represent the following logic functions:
    - AND
    - OR
    - NOT
11. Given the table below, Consider a perceptron with weights $w_1 = -0.5$, $w_2 = 0.1$, and $w_3 = 0.4$, bias $b = 0.2$, and learning rate $\alpha = 0.01$. Train for 2 iteration with weights updated after each sample and then calculate the accuracy

Sample	***X1***	***X2***	***X3***	***Label***
1	0.2	0.5	0.7	1
2	0.1	0.3	0.6	-1
3	0.4	0.8	0.2	1
4	0.6	0.4	0.9	-1

Coding Question

Write code to repeat question 11 but with the weights updated after a full iteration using MSE loss, compare the final weights and accuracy.

Deliverable

- This sheet is to be solved **Individually**.
- You are required to submit a ZIP file named **ID_FirstName_LastName_sheet3.zip**, any other naming format will not be accepted and file will be discarded.
- Inside the ZIP file there should be the PDF file with solutions for the questions and the Downloaded Colab Notbook for the Coding question
- Any copied sheets will be immediately zeroed and other penalties may be applied.

Good Luck