Date: 21-06-2021 **Assignment # 03**

Subject: Artificial Intelligence (AI)

Total Marks: 100

Deadline for submission is **16:00 PKT, Wednesday 30th June, 2021**. Submit your assignment (Code) online on Slate.

Question # 01:

For a simple network architecture of **XOR function** with two inputs, implement a program in Python (**you can't use any machine learning library**) that uses **gradient decent** to find a weight vector that minimizes the training loss.

Question # 02:

Implement an **Artificial Neural Network (ANN)** based classifier that takes as input a **100x100 binary image (generate images in paint)**.

- The input array should contain **digits (0 to 9) written** in different **patterns** (rotated/scaled/tilted etc.).
- Each digit should have at least **50 training examples** in the training data (so you have to create a total of **10x50 = 500** training examples).
- Your classifier should find a **weight vector** that can be used to classify patterns of this type.
- **Number of input, output, and hidden layer size will be your choice and you should provide justification for that.** Try to be simple in your design.

An **example** input of digit 1 (**EXAMPLE** size of 10x10 (only example)):

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	**1**	0	0	0	0
0	0	0	0	**1**	**1**	0	0	0	0
0	0	0	0	0	**1**	0	0	0	0
0	0	0	0	0	**1**	0	0	0	0
0	0	0	0	0	**1**	0	0	0	0
0	0	0	0	**1**	**1**	**1**	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

Good Luck!