Date: 17-05-2022 **Assignment # 02**

Subject: Artificial Intelligence (AI)

Total Marks: 100

Weightage: 5

Deadline for submission is **17:00 PKT, Monday 6th June, 2022**. 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 that uses **gradient decent** to find a weight vector that minimizes the training loss (**Note: You can't use any machine learning library for this question**).

Question # 02:

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

- The input array should contain upper case English **alphabets (A to Z) written** in different **patterns** (rotated/scaled/tilted etc.).
- Each alphabet should have at least **10 training examples** in the training data (so you have to create a total of **26x10 = 260** training examples).
- Your ANN 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.
- Test your classifier on previously unseen images and report accuracy.

An **example** input of letter A is given below (input size of 10x10):

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

Good Luck!