CMPSC 445-001 **Spring 2025**

Assignment -5 (100 points)

[Late submission will get a 10% penalty for every day.]

1. Look at the skeleton of the Python file (save it to your drive) and complete the tasks based on the descriptions.

2. Write a python program for backpropagation Neural Networks (for the following data set). For this problem, don't use any machine learning libraries. You can use NumPy and pandas. Also, you can use train/test split from scikit learn.

Find output using the Neural Network for the Testing Data 1 and 2 (given the following Table). Also show all calculations for full credits. **Use Backpropagation technique**.

Initial weights/value of W_1=**0.3**, W_2=**0.1**, W_3=**0.3**. Learning rate, **η=0.01**
Optimizer is: sgd (gradient descent)
For the simplicity of calculation, you can omit **bias** for this example.
Activation Function is **sigmoid** where f=1/(1+e^(-u))
Data set

	Input			output
	I_1	I_2	I_3	
Training Data	1	1	0	0=d_1
	0	1	0	0=d_2
	0	1	1	1= d_3
Testing Data-1	1	0	0	?
Testing Data-2	0	0	1	?

Submission of this assignment:

- Pdf file: report based on the outputs for both problems.
- Python files or notebooks.