1. **10 Points**

   Using the MNIST dataset, create a model with four dense layers. You can use any activation function.

   a. Tune the parameters to get at least 95% accuracy.

   b. Explain your process for selecting the activation functions, loss functions, and dense layer dimensionality of the output space.

   c. Display the confusion matrix of your final model.

2. **10 Points**

   Create a model to optimize prediction of the IRIS dataset using a perceptron.

   a. Load the IRIS dataset and split the data Split the data into two with 70% for training and 30% for testing.

   b. Create a Perceptron class and instantiate a new Perceptron. Fit the data to the model for 10 training iterations. Compute the prediction.

   e. Plot the prediction for 100 epochs.

3. **10 Points**

   Generate three clusters with 500 points each with a standard normal distribution but with the following variance (σ) and means (μ):

σ_1 = (1.2,0.8)	μ_1 = (-2,-2)
σ_2 = (0.4, 1.3)	μ_2 = (1,-1)
σ_3 = (0.8, 0.9)	μ_3 = (6,12)

   a. Plot the three clusters with different colors for each to show the truth data.

   b. Select three cluster centers and plot the selection along with the dataset.

   c. Use the k-Means clustering algorithm to classify the datapoints to a cluster. Plot each iteration and exit the process when it reaches a prior estimation error of less than 0.01.

   d. Repeat the process, but use 4 clusters instead of 3.

4. **10 Points**

   Load the breast cancer dataset from Scikit-Learn.

   a. Split the data into 50% training and 50% testing.

   b. Create a SVM classifier and train the model.

   c. Predict the output using the testing data.

   d. What is the accuracy, precision, and recall scores?