

Q7)

In this question, we have asked to work on iris dataset and came up with a Neural Network model that best fits the data. I have used the given ANN class but did a small change. The target value data was in format of one dimensional array that has values between 0 to 2. I changed this so that it will have the 3 dimensions that the index of target value is 1 and others are zero. I also had to change the predict function so that y array is mx3 dimensions to adjust these changes.

After shuffling the data samples(it is done because they were ordered according to their target values) I have splitted the data into train, validation, and test data. In a simple for loop, I have trained 10 different NN models on these training sets and test them on the validation set. I had to do this step for some time to adjust the hyperparameters. I have decided to choose **hidden layer size as 6, eta as 0.2 and iteration number as 1000**. The error rates of the models can be seen in figure below. After doing this I have chosen the best fitting model that has the lowest error rate and run it in test data and it came out this model has a **%100 accuracy**.

```
Epoch 0 error rate: 0.007892585193490056
Epoch 1 error rate: 0.008821103352110065
Epoch 2 error rate: 0.007704124893606605
Epoch 3 error rate: 0.007272202276264896
Epoch 4 error rate: 0.00848157934681879
Epoch 5 error rate: 0.008235629263669187
Epoch 6 error rate: 0.0076674305576878874
Epoch 7 error rate: 0.0080680666303618
Epoch 8 error rate: 0.007411416242247418
Epoch 9 error rate: 0.00771544222398206
Accuracy: 1.0
```

Confusion Matrix of the model can be seen in this figure.

