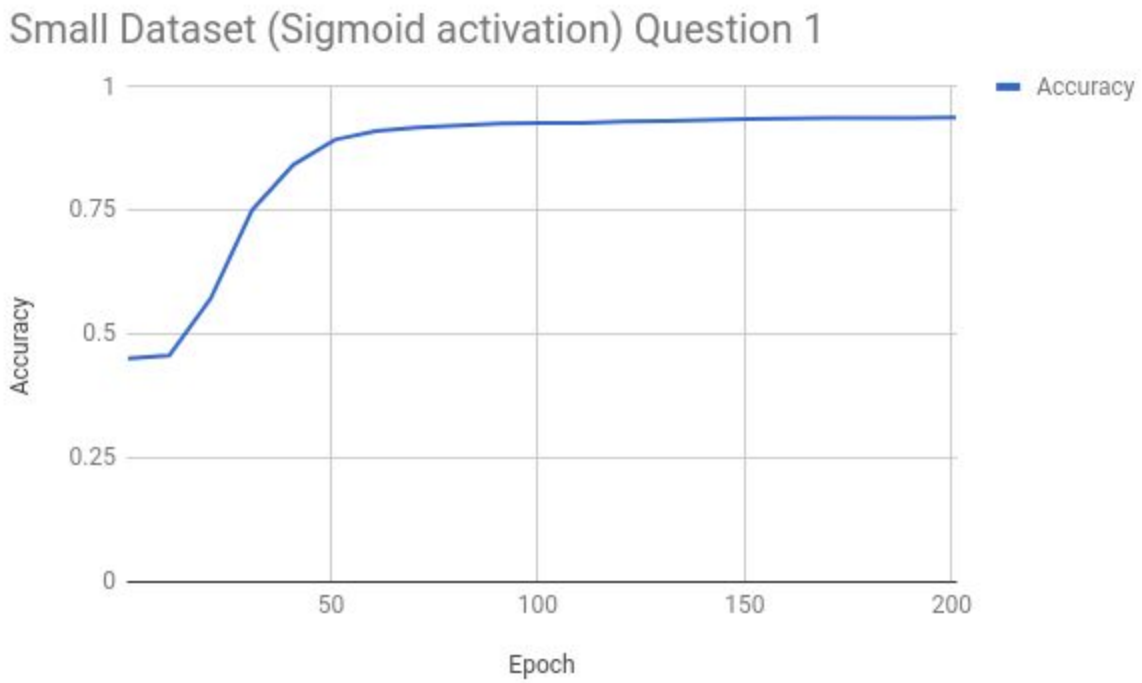
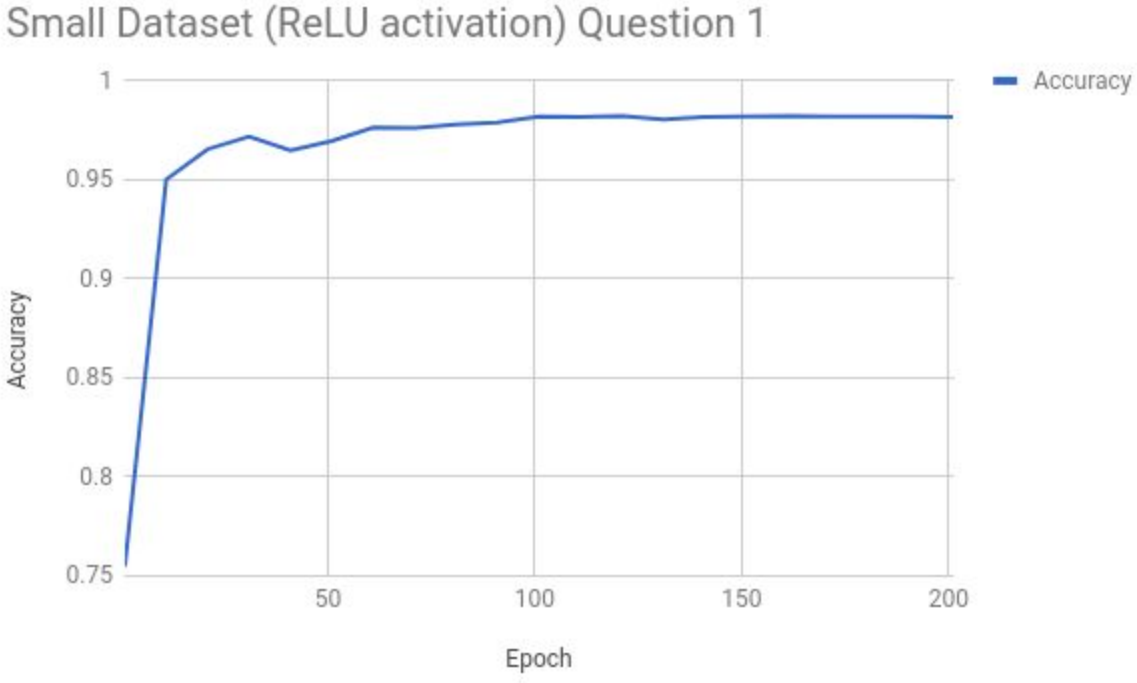
Assignment 3 Report

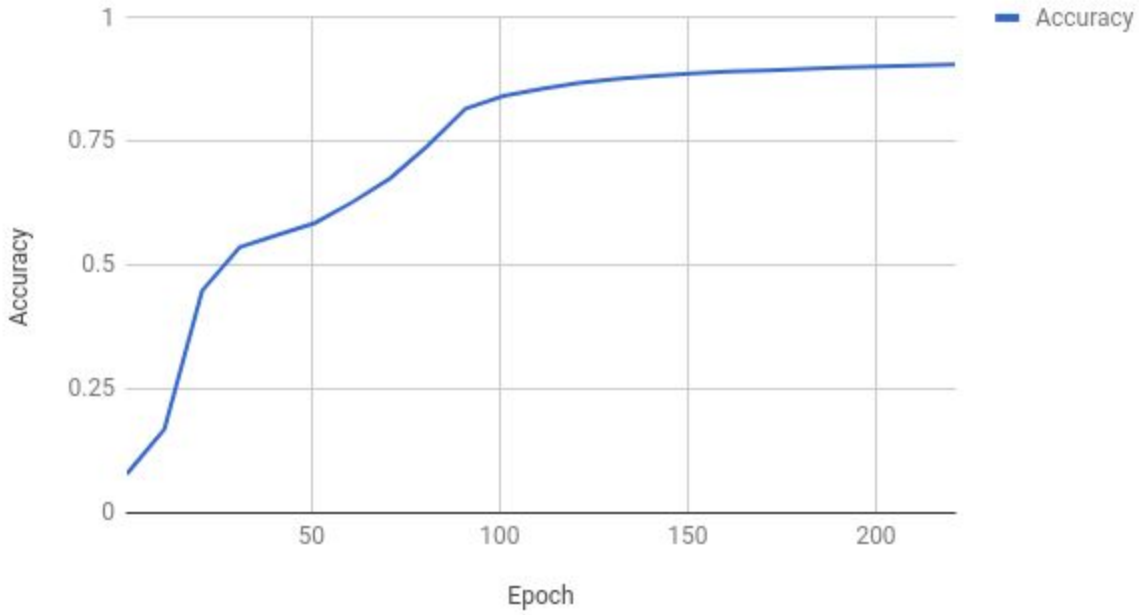
Shubham Khanna [2015179]

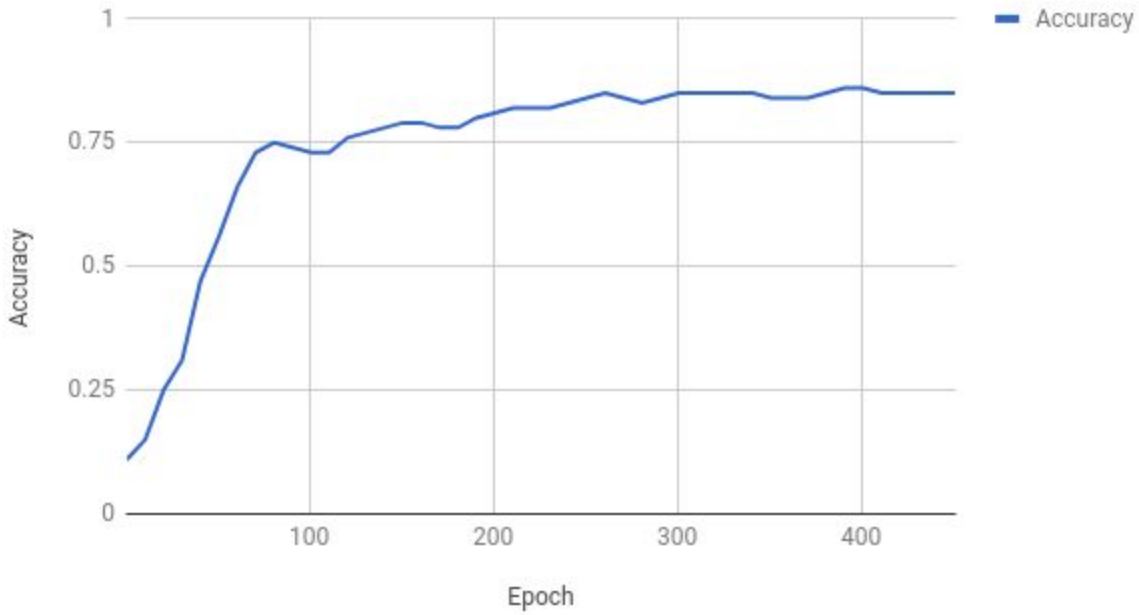
Question 1

Small Dataset



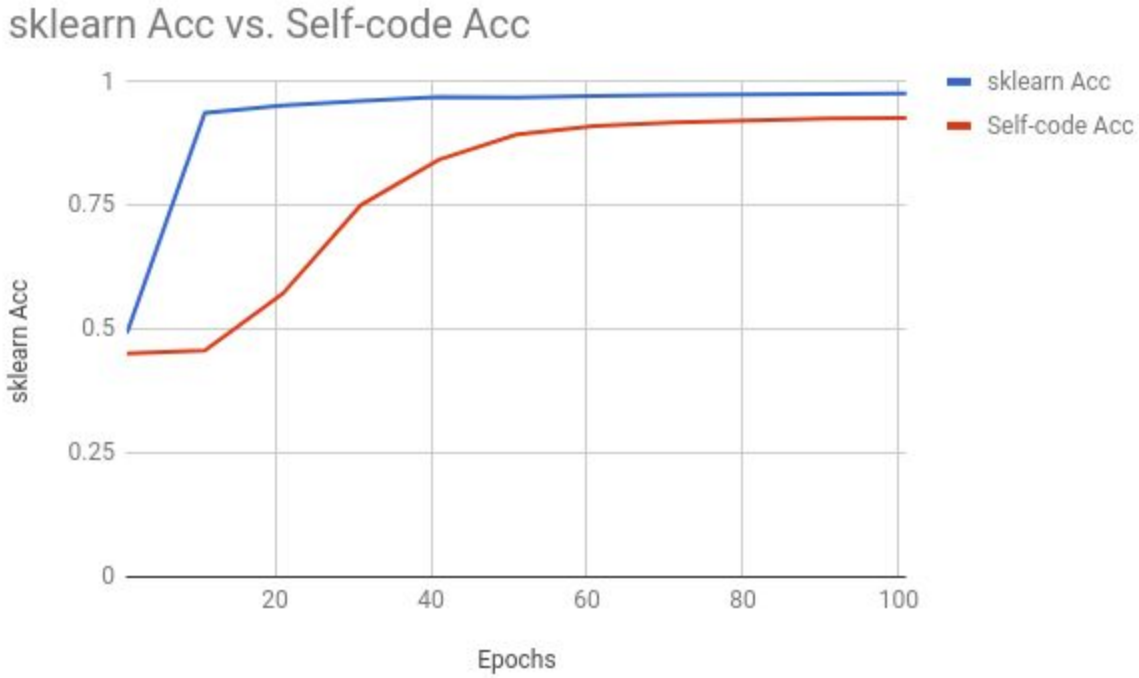



Large Dataset (ReLU activation) Question 1
Accuracy
1
0.75
0.5
0.25
0
Accuracy
50
100
150
200
Epoch


Large Data (Sigmoid) Question 1
Accuracy
1
0.75
0.5
0.25
0
Accuracy
100
200
300
400
Epoch

Question 2

a) I used sklearn's MLPClassifier() with hidden_layer_sizes = (100,50) i.e 2 hidden layers of sizes 100 and 50. 'Sigmoid' activation model was used. The images were reshaped to vectors as well as the classifier was turned from a multi-class classifier to a binary classifier, since the dataset only contained two images. The following trend was found:



b) Sklearn's classifier uses softmax at the output layer. The following accuracy was found for the larger dataset.

Question 3

Dataset: MNIST dataset

I tried 4-5 kinds of models with varied number of layers and layer sizes. The following layers gave an **accuracy > 0.98.**

Model 1

```
clf = MLPClassifier(activation="relu", alpha=0.01, hidden_layer_sizes=(800),
learning_rate='constant',
      learning_rate_init=0.01, max_iter=150, momentum=0.95, random_state=1,
       solver='lbfgs', verbose=True)
```

Accuracy: 97.885

Model 2

```
clf = MLPClassifier(activation="relu", alpha=0.01, hidden_layer_sizes=(500,300),
learning_rate='constant',
      learning_rate_init=0.01, max_iter=200, momentum=0.95, random_state=1,
       solver='lbfgs', verbose=True)
```

Accuracy: 0.9779

Model 3

```
clf = MLPClassifier(activation="relu", alpha=0.01, hidden_layer_sizes=(300,100),
learning_rate='constant',
      learning_rate_init=0.01, max_iter=150, momentum=0.95, random_state=1,
       solver='lbfgs', verbose=True)
```

Accuracy: 0.9754