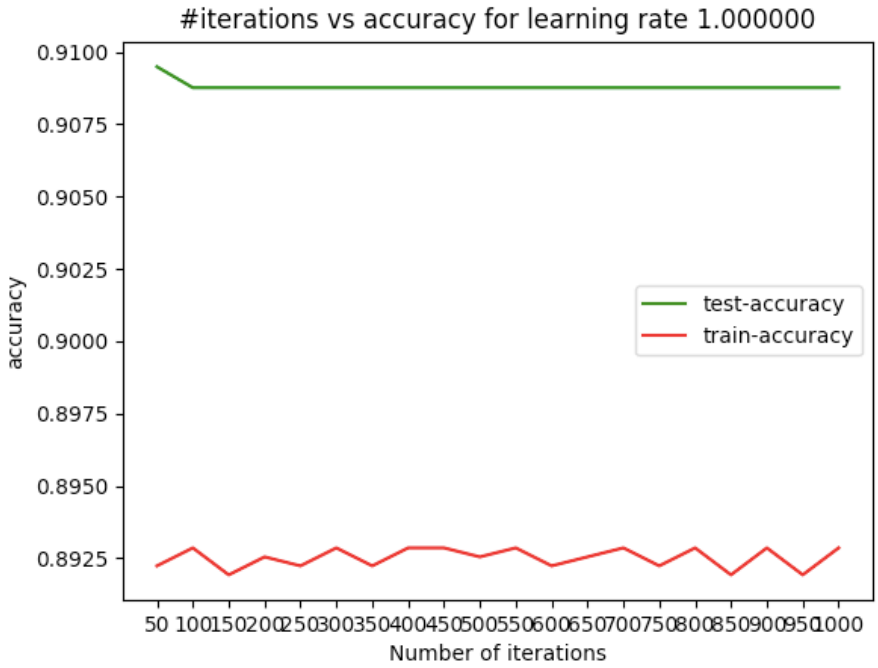
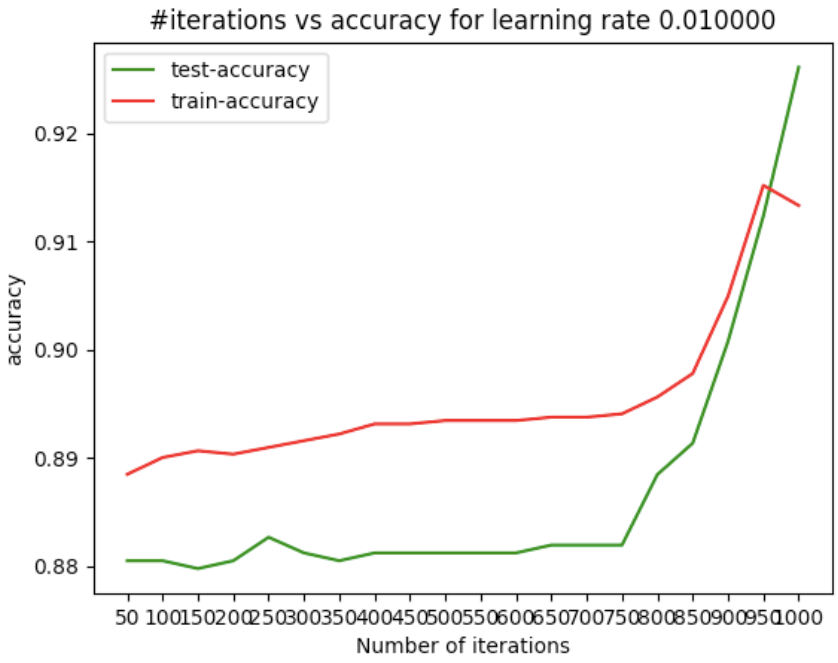
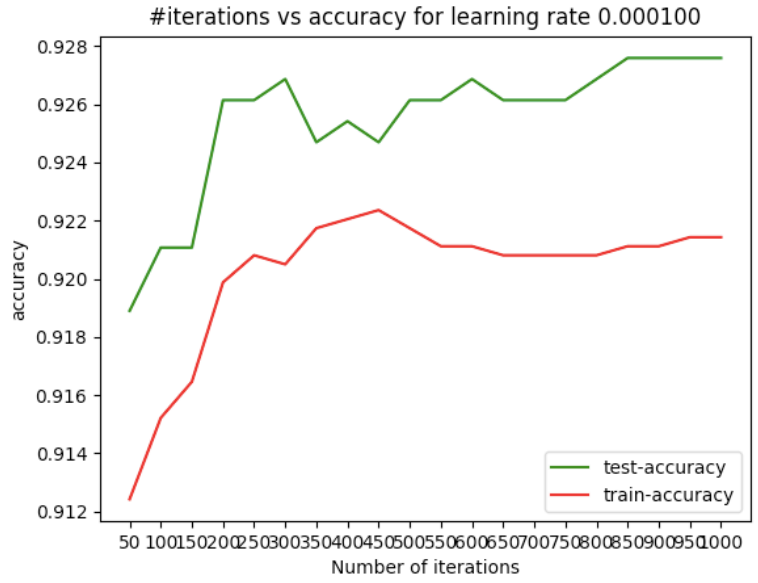
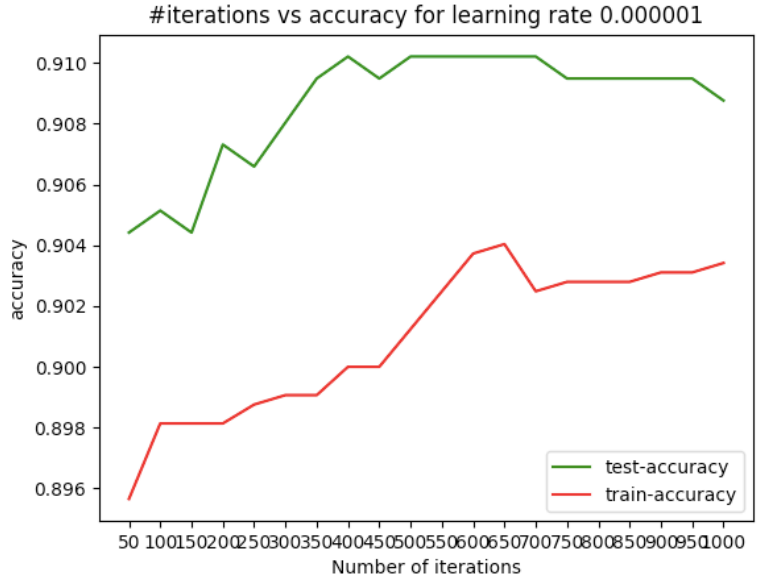
Assignment3 – Plots for Programming Question

3a.







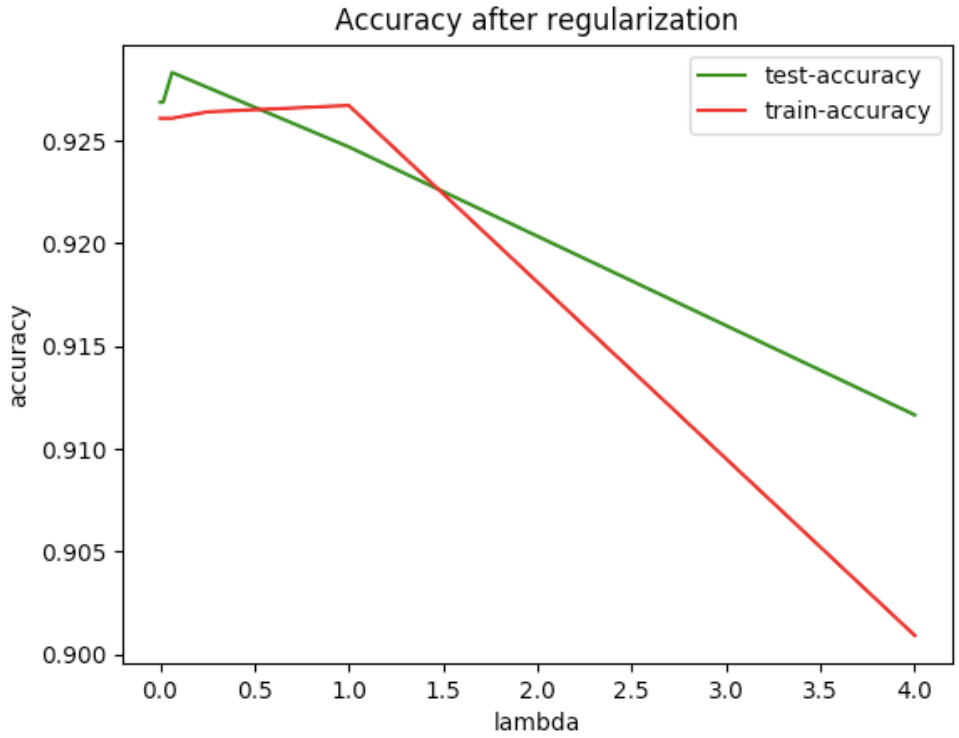


Learning Rates comparison:
learning rate = 1, train accuracy = 0.8928571428571429, test_accuracy = 0.9087617668356264
learning rate = 1e-02, train accuracy = 0.9133540372670808, test_accuracy = 0.9261404779145547
learning rate = 1e-04, train accuracy = 0.9214285714285714, test_accuracy = 0.9275887038377987
learning rate = 1e-06, train accuracy = 0.903416149068323, test_accuracy = 0.9087617668356264

As the learning rate becomes smaller, both test and train accuracies **first increase and then decrease**. I observed that the model performs the best for the intermediate value of learning rate i.e. **1e-04**.

3b.

Learning Rate = {1e-3}



Without regularization:
lambda = 0, learning rate = [0.001], train accuracy = **0.9260869565217391**, test_accuracy = **0.9268645908761767**

After regularization:
I observe that for increasing values of lambda, both train and test accuracies **slightly increase and then go down** as compared to non-regularized version because regularization reduces the noise in the model (the cause for overfitting).

As lambda increases, the accuracies drop more and more. This is the expected observation. When lambda increases significantly, gradually it starts underfitting the model which leads to decrease in training accuracy and thus, it affects even the test accuracy.