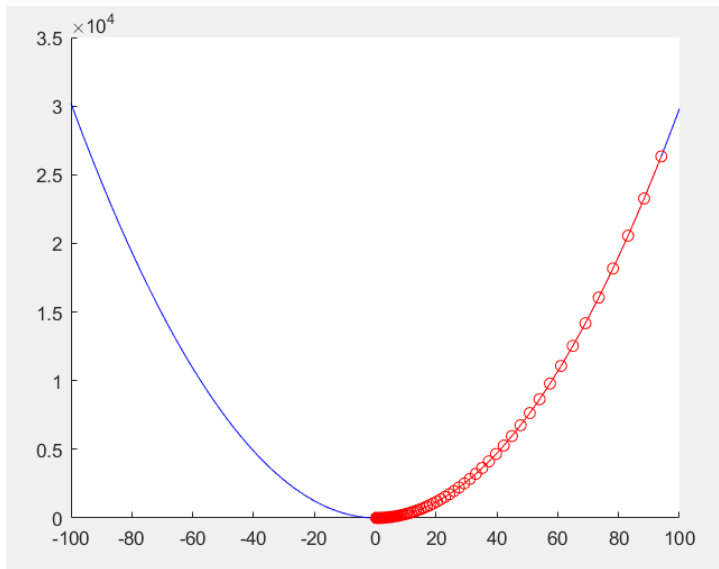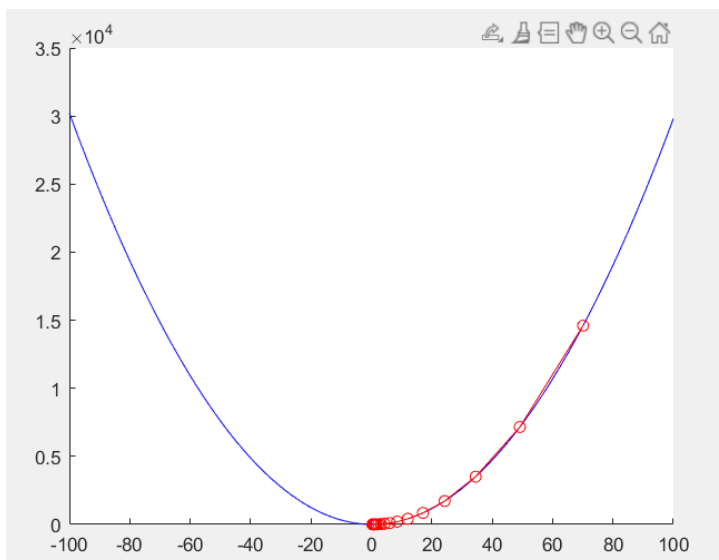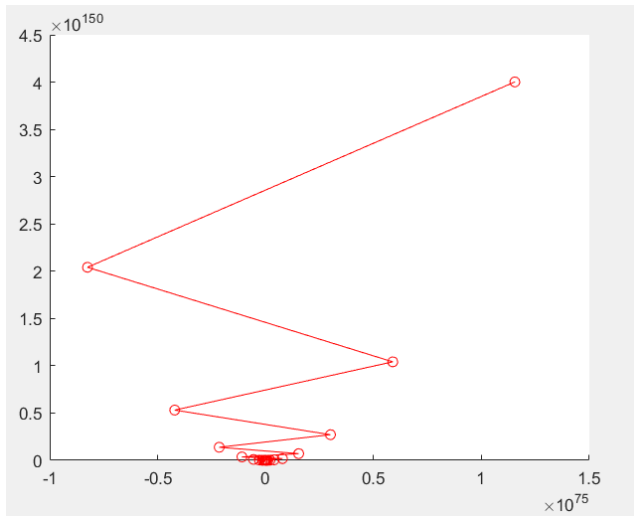## Part1

Part2

Observation: There are less points, which means when learning curve changed from 0.01 to 0.05, it has larger steps and will arrive to the solution more quickly while still reaches the minimum.

Part3

Observation: The graph looks totally different. The learning rate is too high which caused each step has an excessively huge jump on the graph. The original plot is barely discernible in the plot. It does, however, reach the minimum point at the conclusion.

Part4

Classifier	Accuracy	Precision	Recall	F1	Time (sec)
SVM (linear)	87.61%	87.34%	87.85%	0.88	26.62
SVM (Gaussian)	97.31%	97.25%	97.23%	0.97	21.78
SVM (poly = 3)	96.83%	96.71%	96.77%	0.97	57.76
kNN (Euc. k = 5)	93.67%	93.31%	93.79%	0.93	30.82
kNN (City. k = 5)	95.08%	94.77%	95.20%	0.95	29.51
kNN (Euc. k = 3)	93.94%	93.60%	94.01%	0.94	29.87
kNN (Euc. k = 1)	93.40%	93.03%	93.42%	0.93	29.37
Naïve Bayes	76.05%	75.65%	75.93%	0.75	1.32
Decision Tree	77.76%	77.26%	77.99%	0.78	0.88

Part5
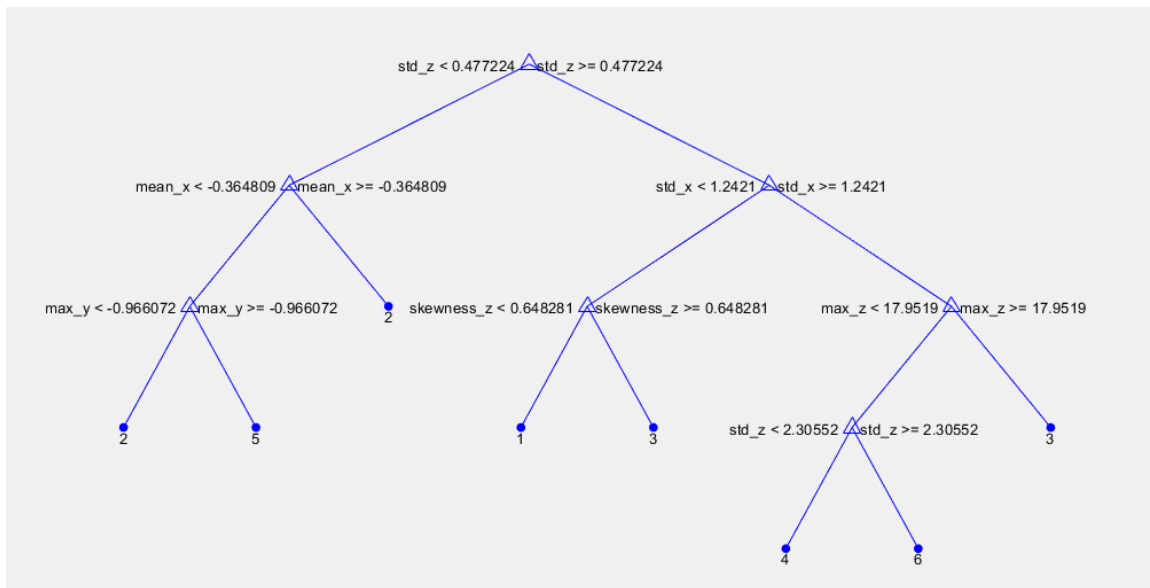
Part6

(a) Gaussian SVM is the most accurate and takes the shortest amount of time to train. Because there is no free launch theorem, the result should not be universal. The explanation for this may be that the properties of human behaviours are not entirely dependant, causing the Naive Bayes and Decision Tree to have lesser accuracy in this scenario.

(b) The overfitting approach is KNN (Euc, k=1), since the result for training data accuracy is 100%, which means for all the training data it records every training, it did not do the generalization. Furthermore, the training and test accuracy are nearly equal for other methods, but for KNN (Euc, k=1), the testing data accuracy is around 93%, which has a big difference with 100% training data accuracy.

Classifier output fold 1 - test acc: 93.53% - train acc: 100.00%
Classifier output fold 2 - test acc: 93.36% - train acc: 100.00%
Classifier output fold 3 - test acc: 92.92% - train acc: 100.00%
Classifier output fold 4 - test acc: 93.18% - train acc: 100.00%
Classifier output fold 5 - test acc: 93.14% - train acc: 100.00%
Classifier output fold 6 - test acc: 93.89% - train acc: 100.00%
Classifier output fold 7 - test acc: 94.07% - train acc: 100.00%
Classifier output fold 8 - test acc: 93.14% - train acc: 100.00%
Classifier output fold 9 - test acc: 94.16% - train acc: 100.00%
Classifier output fold 10 - test acc: 93.23% - train acc: 100.00%

(c) The decision tree is the quickest, whereas the 3rd order polynomial SVM is the slowest.