# Ans1.1

The training error of a 1-NN will always be better than that of 5-NN.

The statement is correct. The training error will always be less or zero for 1-NN classifier. When k=1, for each data point, x, in our training set, we want to find one other point, x′, that has the least distance from x. The shortest possible distance is always 0, which means our nearest neighbor is actually the original data point itself, x=x′.

# Ans1.2

The test error of a 1-NN will always be better than that of a 5-NN.

The statement is incorrect. As the 1-NN classifier is an over-fitted model, the test error is larger for it. When we increase the k value, the test error decreases till an optimal value of k. After that if we increase k-value further, the test error starts increasing.

# Ans1.3

The decision boundary of the k-NN classifier is linear.

This is an incorrect statement. The decision boundary of k-NN classifier depends on the value of k. If the k value is very less like ‘1’ then the decision boundary is not linear. As the value of k increases, the decision boundary starts becoming smoother. Also the distance function used in k-NN classifier is not linear so the decision boundary is not linear.

# Ans1.4

The time needed to classify a test example with the k-NN classifier grows with the size of the training set.

This is a correct statement. As the k-NN classifier does not work on training first and then prediction, most of the calculations happen at the time of classification. As the size of the training set increases, the computation time increases.