**Q 3.1**

Data was split into training, test and validation set to enable performance evaluation of the model when making predictions on previously unseen observations or observations not used in the training of the model. The purpose of the validation set is to help in hyperparameter tuning of the model parameters and it also helps to detect overfitting. Training and testing on the same dataset make models prone to overfitting.

**Q 3.2**

The initial evaluation and parameter tuning was done on the validation set so as to save the test set for final model evaluation as the test set serves as new and unseen data for final model evaluation. Also, hyper parameter tuning on the test set makes the model prone to increased generalization gap.

**Q 3.3**

Lower ‘k’ will cause higher variance. Higher k will cause higher bias.

**Iris Dataset**

As we increased the value of k, the accuracy changed. The accuracy was high for low values of K = {1, 5} and began to fall as ‘k’ increased. For values of K > 20, the accuracy was low and constant.

The accuracy was **not** affected the same with an increase of k.

The Iris dataset is a relatively small dataset. Higher values of ‘k’ result in increased bias. For k > 10, the model started to develop high bias. Also, at k > 10, points from other classes may have been introduced into the neighbourhood.

**Heart Disease Dataset**

The variation in accuracy with changes in k was quite random.