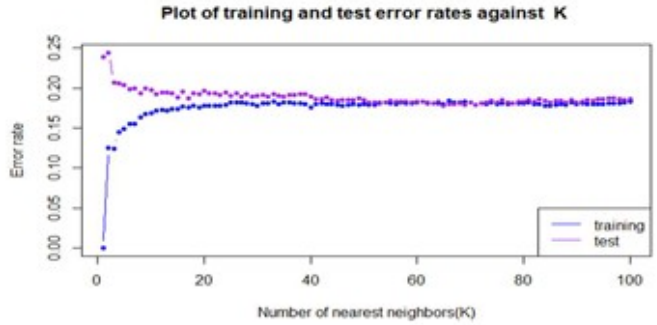
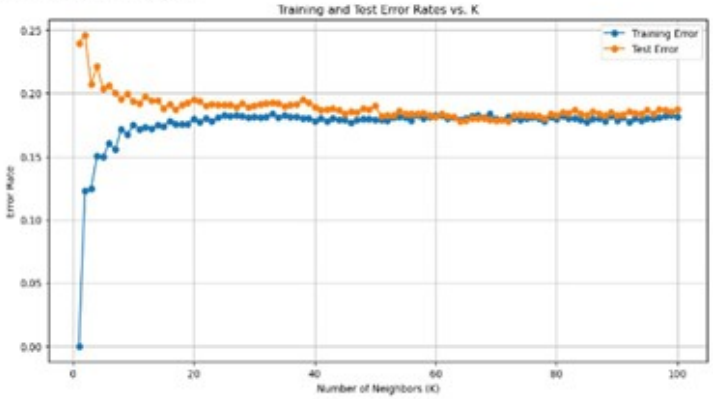
(b) Plot training and test error rates against K. Explain what you observe.

Output using R.



(b)→ The Python and R plots both show similar trends: low training error at K=1 that increases as K rises, and test error that initially decrease, reaches a minimum, and then stabilizes. Differences include slightly higher and more variable test error rates in the R plot at low K. These variations may result from differences in data splitting, scaling, or algorithm implementation between Python and R. But overall behavior aligns with expected KNN model performance.

Output Using Python.



(c) What is the optimal value of K? What are the training and test error rates associated with the optimal K? →minor variations likely due to differences in algorithm implementation between two

R Language	Python
K= 65 Training Error =0.18805, Test Error= 0.1785	K=64 Training Error=0.1790, Test Error= 0.1780

(d)Python K=64, the decision boundary is smooth, more generalized model with smoother transition. With R K=65 the boundary is more jagged. Both boundaries reflect some misclassification, especially in overlapping area, which is consistent with the expected KNN classification, but differ in boundary smoothness and sensitivity to data.