# Problem 1:

Accuracy of linear kernel is 0.9571428571428572

Confusion matrix for linear kernel

tp: 34, fp: 1, tn: 33, fn: 2

Accuracy of gaussian kernel is 0.9428571428571428

Confusion matrix for gaussian kernel

tp: 33, fp: 1, tn: 33, fn: 3

Degree is 3

Accuracy of polynomial kernel is 0.9571428571428572

Confusion matrix for polynomial kernel

tp: 33, fp: 0, tn: 34, fn: 3

# Problem 2: Naïve Bayesian

Accuracy of Naive Bayesian is 0.9285714285714286

Confusion matrix for Naive Bayesian

tp: 33, fp: 2, tn: 32, fn: 3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Model | TP | FP | TN | FN | Accuracy(%) | TPR(%) | TNR(%) |
| Linear SVM | 34 | 1 | 33 | 2 | 95.71 | 94.44 | 97.06 |
| Gaussian SVM | 33 | 1 | 33 | 3 | 94.29 | 91.67 | 97.06 |
| polynomial SVM | 33 | 0 | 34 | 3 | 95.71 | 91.67 | 100 |
| Naïve Bayessian | 33 | 2 | 32 | 3 | 92.86 | 91.67 | 94.12 |

# Problem 3:

## Part 1

A green line graph with a black border

Description automatically generated

The best k from “Knee” method is 3

## Part 2

This is before matching the cluster’s class to centroids, x y labels are randomly determined, thus running the code should generate different looking plots each time.

A screenshot of a computer screen

Description automatically generated

Patterns: well, the centroids are roughly in the center of each cluster, as expected.

There are not many other interesting patterns.

## Part 3

**THIS WILL CHANGE BETWEEN RUNS, PLEASE REFER TO PYTHON OUTPUT FOR THAT RUN’s output.**

**I have changed the random state to 0 to fix it, you can remove that if you want to see how code handles having random states.**

Assign cluster 0 with class label 3

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Centroid for cluster 0: [11.96441558 13.27480519 0.8522 5.22928571 2.87292208 4.75974026

5.08851948]

Assign cluster 1 with class label 2

Centroid for cluster 1: [18.72180328 16.29737705 0.88508689 6.20893443 3.72267213 3.60359016

6.06609836]

Assign cluster 2 with class label 1

Centroid for cluster 2: [14.63985915 14.45507042 0.87928169 5.56097183 3.27742254 2.65496056

5.19192958]

A screenshot of a computer

Description automatically generated

## Part 4

Overall accuracy is 0.8947368421052632

## Part 5

Accuracy is: 0.8561151079136691

tp: 60, fp: 1, tn: 59, fn: 10

tpr: 0.8571428571428571, tnr: 0.9833333333333333

This classifier has less accuracy, and lower tpr than any of the other classifiers above.

It does have better tnr than most classifiers listed above other than polynomial SVM.