1.1 PRIMAL SOLUTION

NUMBER OF MISCLASSIFICATIONS ARE PROVIDED IN EACH SET

C	TRAINING	VALIDATION	TEST
1	166	52	234
10	158	49	295
100	**154**	**49**	**303**
1000	155	50	304
10000	155	50	304
100000	155	50	304
1000000	155	50	304
10000000	155	50	304
100000000	155	50	304
BEST		**C = 100**	**1-(303/800) = 62.15**

Best C = 100
Test accuracy = 62.15%

1.2 DUAL SOLUTION

C, SIGMA	TRAINING	VALIDATION	TEST
C = 1, sigma = 0.1	99.96666667	19.39924906	73.65612101
C = 1, sigma = 1	99.93333333	25.281602	75.25349473
C = 1, sigma = 10	89.36666667	76.84605757	61.45181477
C = 1, sigma = 100	75.9	68.21026283	59.69962453
C = 1, sigma = 1000	60.93333333	86.73341677	89.11138924
C = 10, sigma = 0.1	99.96666667	19.39924906	73.6912323
C = 10, sigma = 1	99.96666667	26.28285357	75.25844519
C = 10, sigma = 10	97.66666667	82.85356696	68.21026283
C = 10, sigma = 100	86.93333333	80.60075094	64.20525657
C = 10, sigma = 1000	65.3	84.10513141	85.60700876

C = 100, sigma = 0.1	99.96666667	19.774	73.69123041
C = 100, sigma = 1	99.96666667	26.28285357	75.25841947
C = 100, sigma = 10	99.5	69.21151439	87.52917639
C = 100, sigma = 100	99.49983328	84.48060075	90.83027676
C = 100, sigma = 1000	97.03234411	90.1126408	92.93097699
C = 1000, sigma = 0.1	99.96666667	19.39924906	73.69123041
C = 1000, sigma = 1	99.96666667	26.28285357	75.25841947
C = 1000, sigma = 10	99.83333333	68.71088861	54.31789737
C = 1000, sigma = 100	99.79993331	84.73091364	91.03034345
C = 1000, sigma = 1000	98.53284428	90.3629536	92.3974658
C = 10000, sigma = 0.1	99.96666667	19.39924906	73.69123041
C = 10000, sigma = 1	99.96666667	26.28285	75.258419
C = 10000, sigma = 10	99.9	68.5857321	87.429143
C = 10000, sigma = 100	99.866622	84.85607	91.130376
C = 10000, sigma = 1000	99.366455	90.1126408	91.5638546
C = 100000, sigma = 0.1	99.96666667	19.774718	73.69123
C = 100000, sigma = 1	99.96666667	26.28285	75.2584194
C = 100000, sigma = 10	99.9666555	68.585732	87.42914
C = 100000, sigma = 100	99.96665555	83.72966	90.830276
C = 100000, sigma = 1000	**99.69989**	**92.115143**	**92.864288**
C = 1000000, sigma = 0.1	99.96666667	19.39924906	73.6912304
C = 1000000, sigma = 1	99.96666667	26.2828535	75.258419
C = 1000000, sigma = 10	99.96665555	68.21026282	87.12904301
C = 1000000, sigma = 100	99.9666555	83.729662	90.5301767
C = 1000000, sigma = 1000	99.83327775	90.86357947	92.16405468
C = 10000000, sigma = 0.1	99.96665555	19.39924906	73.6912304
C = 10000000, sigma = 1	99.96666667	26.282853	75.258419
C = 10000000, sigma = 10	99.966655	81.3516896	88.6628876

C = 10000000, sigma = 100	99.96665555	81.35168961	88.66288762
C = 10000000, sigma = 1000	90.63021007	79.22403	88.9296432
C = 100000000, sigma = 0.1	99.9666555	19.77471839	73.69123
C = 100000000, sigma = 1	99.966655	26.282853	75.2584194
C = 100000000, sigma = 10	99.966655	68.58573216	87.42914304
C = 100000000, sigma = 100	99.96665555	72.0901126	85.5618539
C = 100000000, sigma = 1000	86.2954318	86.2954318	86.22874291

Found best **C = 100000 and SIGMA=1000**
Best validation accuracy = 92.115%
Best test accuracy = **92.86%**

1.3 KNN

K	**VALIDATION**	**TEST**
1	88.48	72.4
5	89.61	70.75
11	88.48	72.12
15	86.35	71.5
21	86.48	70.87
BEST K	**K = 5**	70.75

1.4 BEST CLASSIFIER

SVM should be preferred for classification of the following task

For this task, SVM primal with slack is yielding us an accuracy of 62%. SVM with Gaussian kernel transforms data into infinite dimension space to which a linear classifier can be fit perfectly.

KNN can be preferred if the number of dimensions of the data set is less than 20. With larger dimensions, it is subject to the curse of dimensionality.