Report for HW3

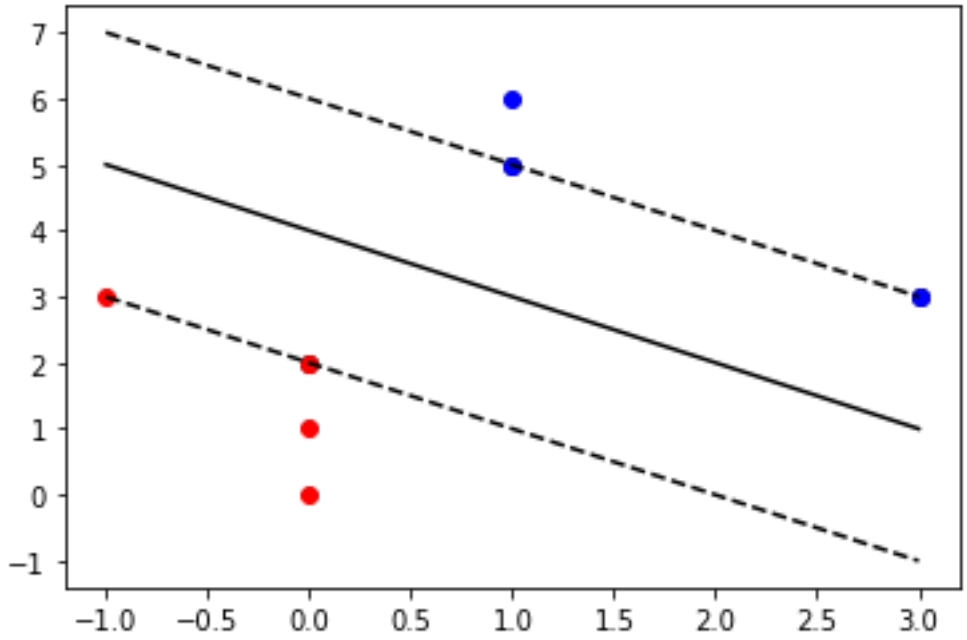
Question 1

a. -- Fitting parameters from SVC --

Coefficient: [[-0.49984 -0.49984]]

Intercept: [1.99925333]

Support Vectors: [[1. 5.] [3. 3.] [0. 2.]]



b. w = [-0.49984 -0.49984]

b = 3.999786598378149

c. -- Fitting parameters from SVC --

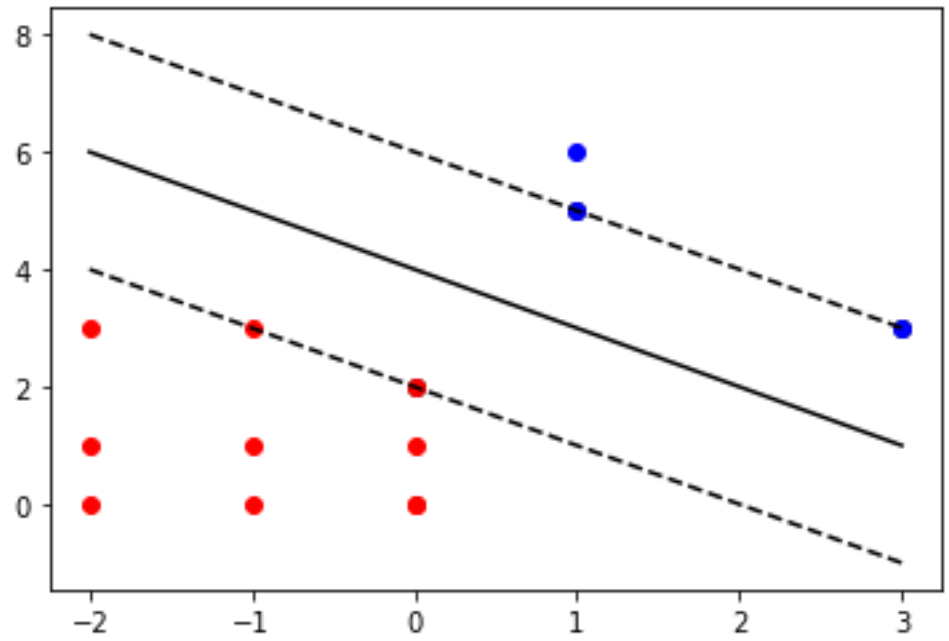
Coefficient: [[-0.49984 -0.49984]]

Intercept: [1.99925333]

Support Vectors: [[1. 5.] [3. 3.] [0. 2.]]

w = [-0.49984 -0.49984]

b = 3.999786598378149



Question 2

The table below is a confusion matrix.

		Actual		Total
		Positive	**Negative**	
Prediction	**Positive**	TP	FP	P
	Negative	FN	TN	N

TP – True Positive FP – False Positive FN – False Negative TN – True Negative

P – Positive N – Negative

1. $Accuracy = \frac{TP+TN}{T+N}$, which means the ratio of successfully classified samples.
2. $Precision = \frac{TP}{P}$, which means the ratio of successfully classified samples in all samples classified as "positive".
3. $Recall = \frac{TP}{TP+FN}$, which means the ratio of correctly classified samples in all samples predicted as "True".

Question 3

Tuning Results:

C	train_accuracy	test_accuracy	precision	recall
0.001	0.95	0.94	0.94	0.97
0.01	0.96	0.94	0.95	0.97
0.1	0.96	0.95	0.95	0.97
1	0.97	0.95	0.95	0.98
10	0.97	0.96	0.96	0.97
100	0.97	0.96	0.97	0.98
1000	0.97	0.95	0.96	0.96
100000	0.97	0.95	0.95	0.96
1000000	0.97	0.95	0.96	0.96

Final Results

	Accuracy		Precision	Recall
	Train	Test		
SVM1	0.97	0.96	0.96	0.97
SVM2	0.98	0.95	0.95	0.96
SVM3 C = 100	0.97	0.96	0.97	0.98