Assignment 3, CLL 788
Ansh Lodhi, 2019CH70161

Answer 1:

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-----------------------Answer 1 -----------------------
<matplotlib.axes._subplots.AxesSubplot at 0x7f4977fdbfd0>
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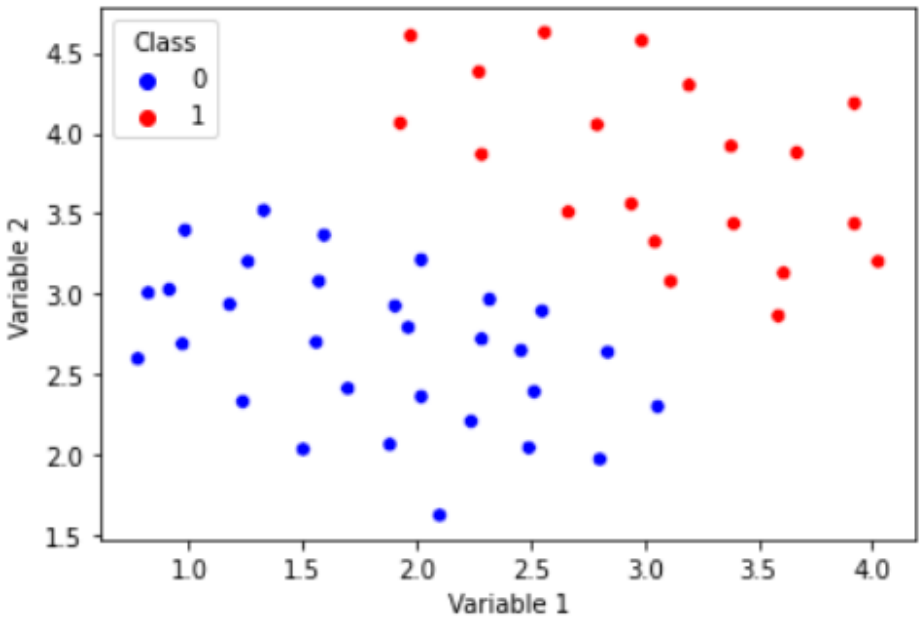

Answer 2 SVM:

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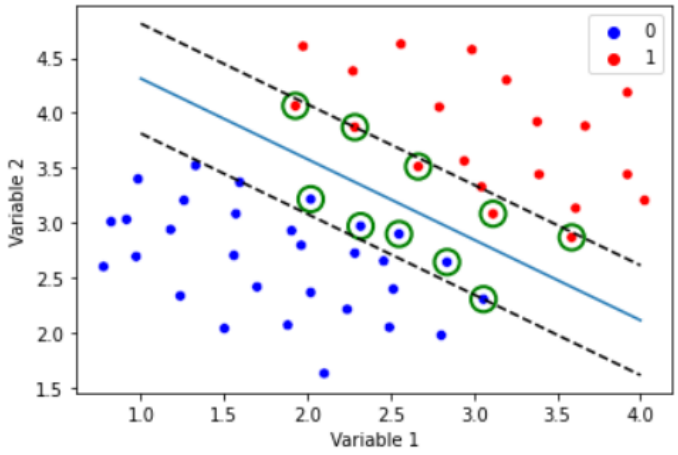
-----------------------Answer 2 -----------------------
Part 1: SVM
Weights predicted by SVM: -10.097993711160566, 1.4682806755680207, 2.001223495072013
```



Answer 2 KMEANS: (Here orange line is meant for separation)

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Part 2: Kmeans Classfiers

Mean Values are as follows:
 [[3.063565 3.800865]
 [1.828335 2.67121 ]]

Orange line is the line passing from the midpoint of mean and is orthogonal to the line joing the two means
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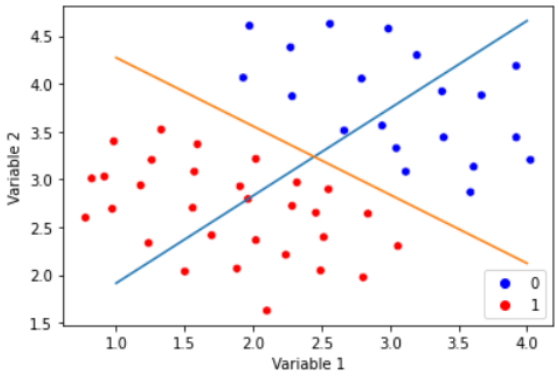

Answer 3 With Modified Optimization Problem:

For this problem, I have tried iterating the value of c from 0.5 to 8 with an interval of 0.5. We can see that since the points plotted cannot be linearly separated.. This may be because some of the features might be overlapping.. We find that for low values of c like 0.5, the classifier acts as an large margin classifier. As we starts increasing the value of C, the classifiers acts like a small margin classifier

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-----------------------Answer 3 -----------------------
Part 1: SVM
Weights predicted by SVM: -12.083267298849188, 0.73020729820405, 3.1720976287492846
```
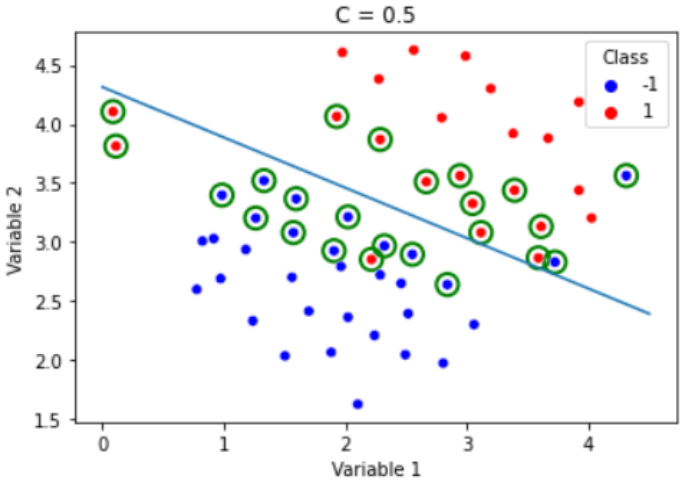
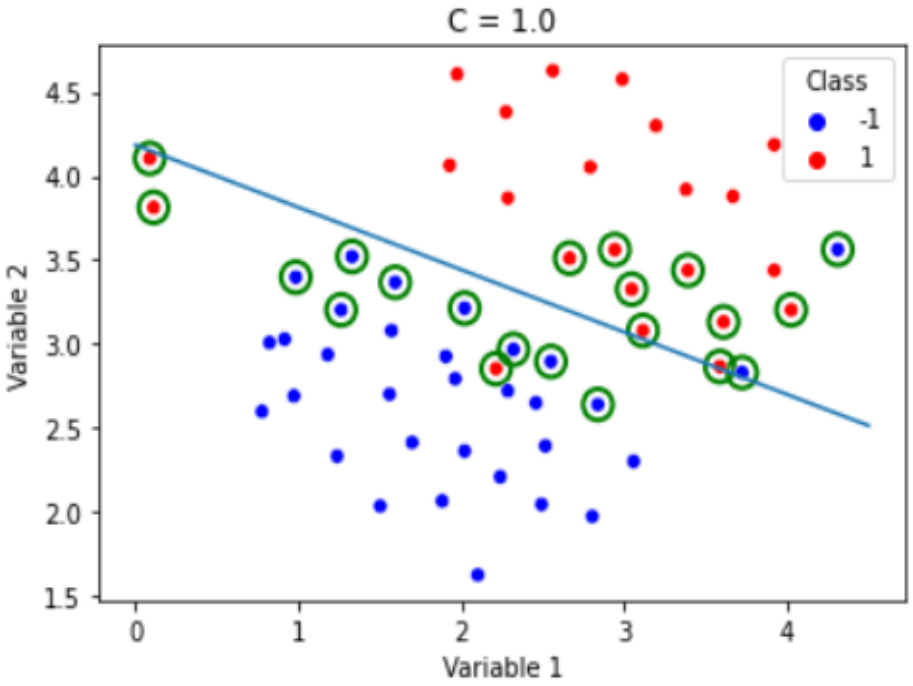
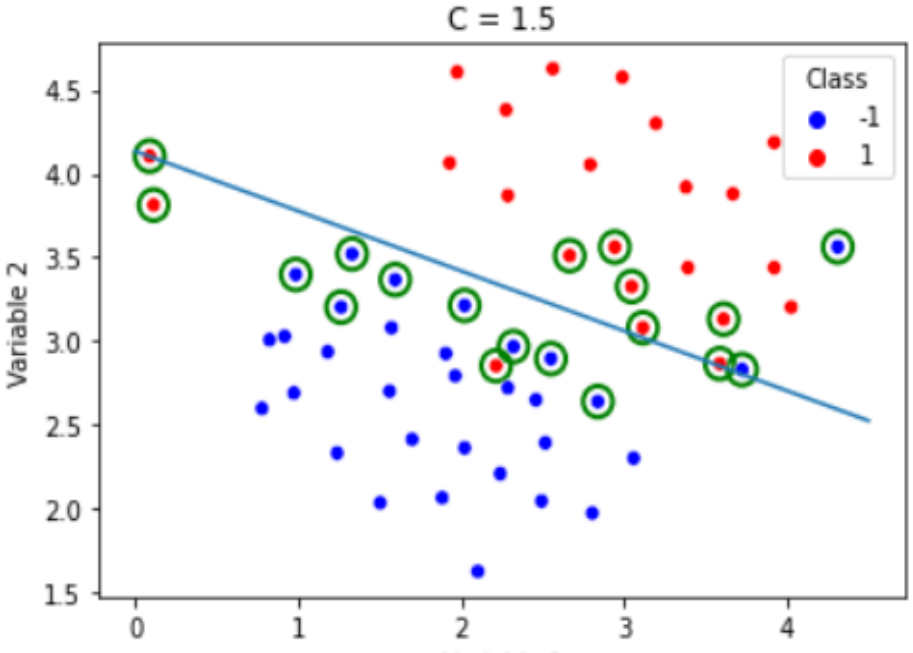
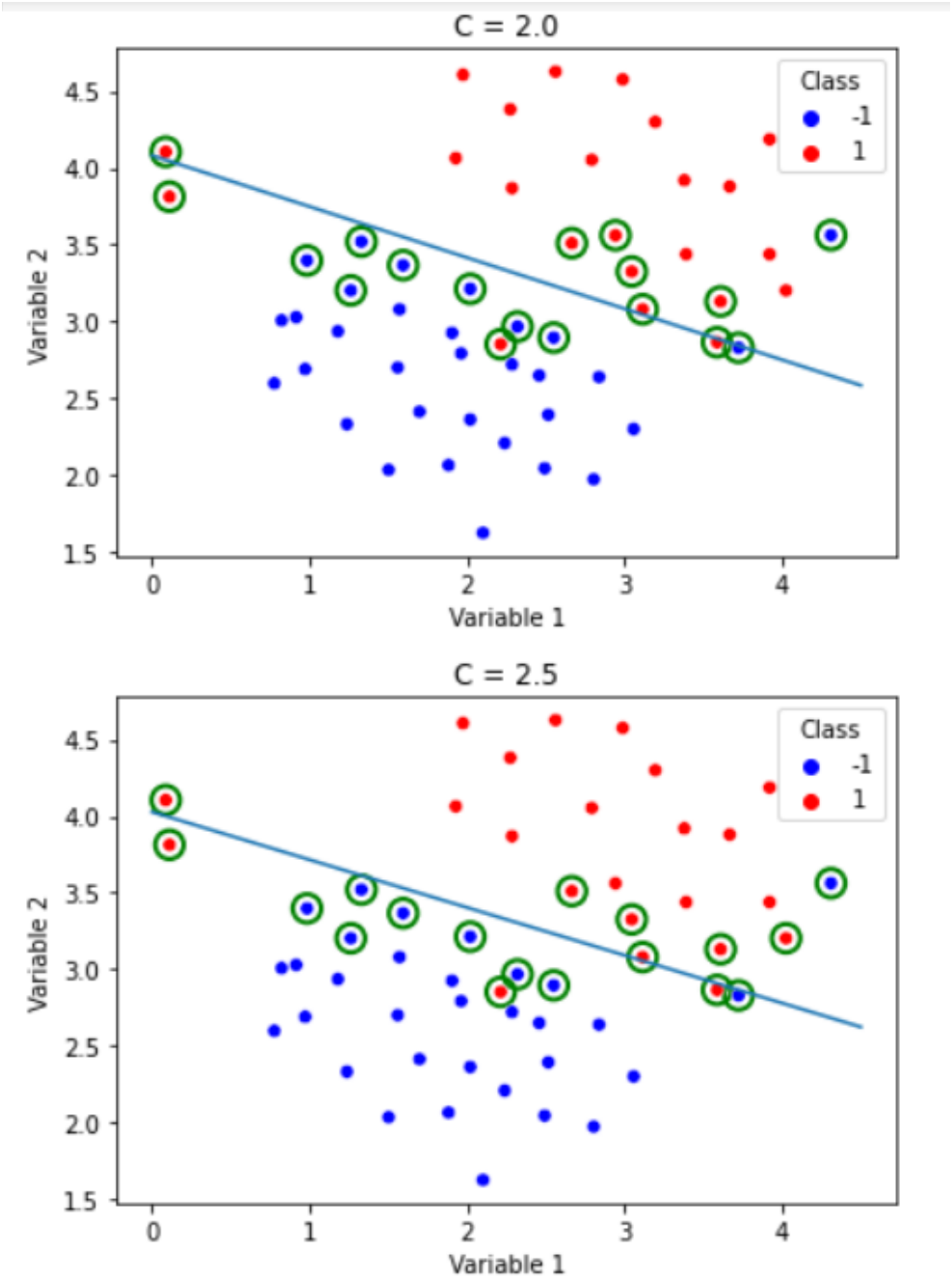
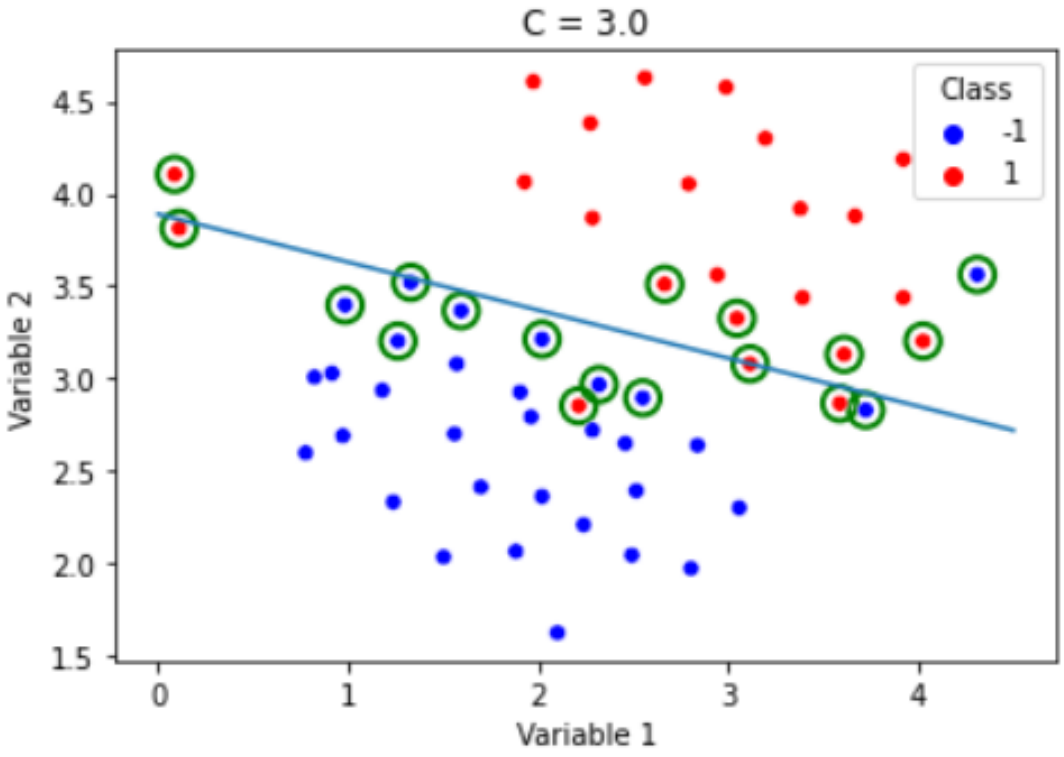
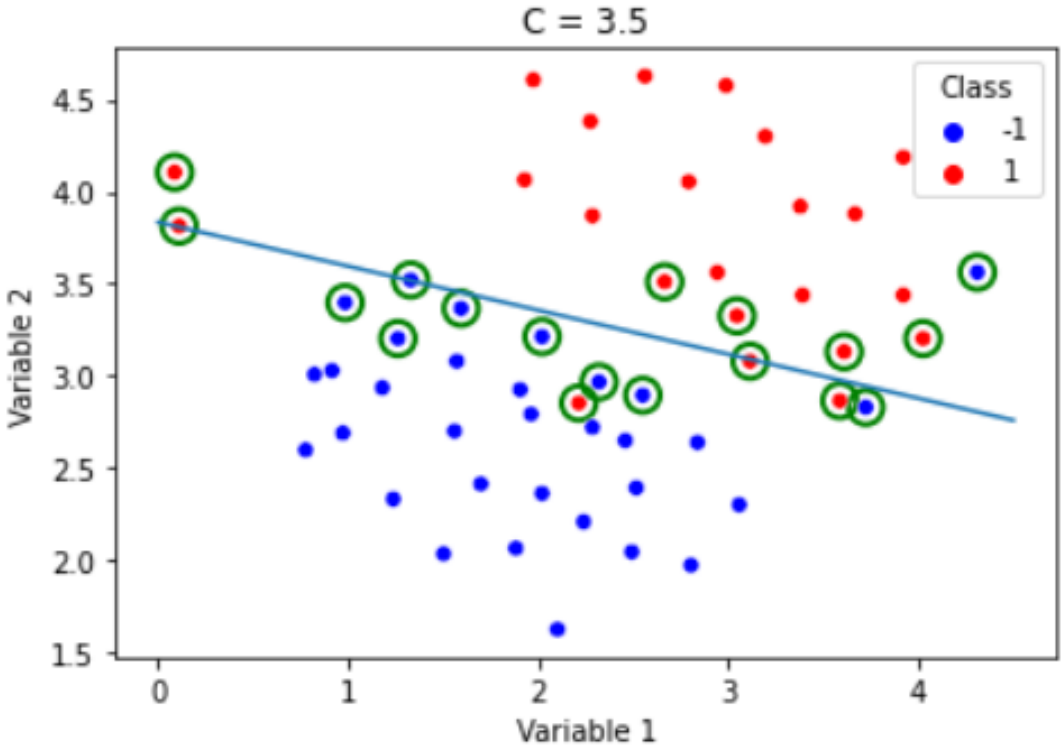



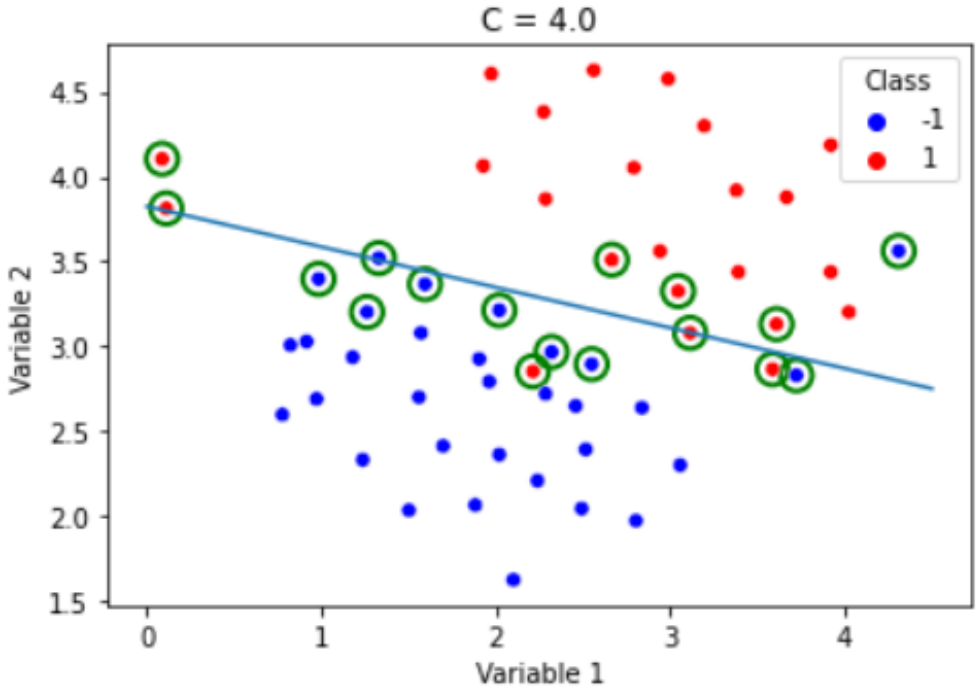

C = 1.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

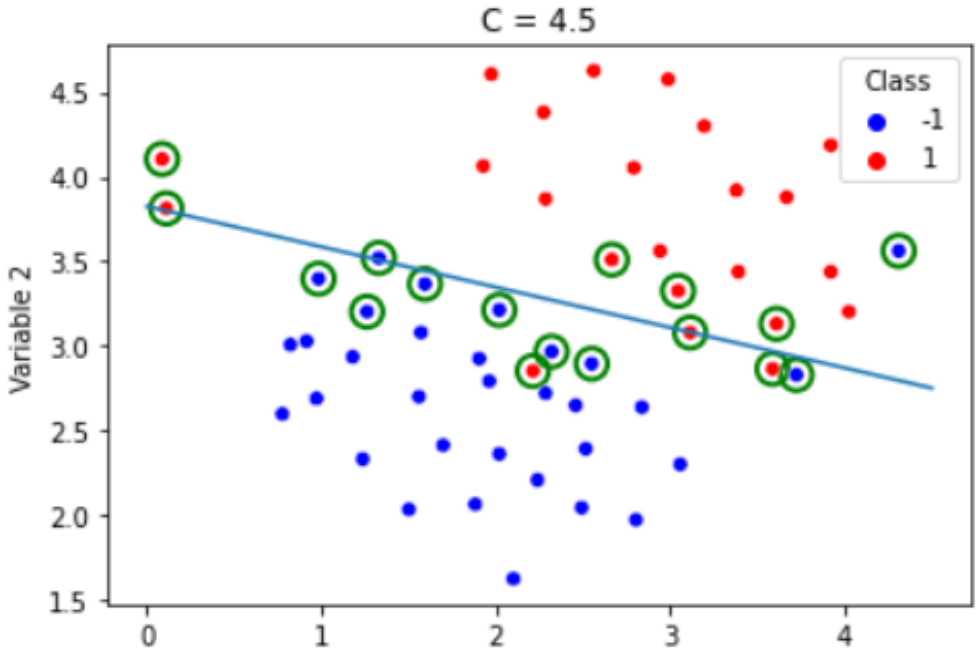

C = 1.5
Class
-1
1
Variable 2
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

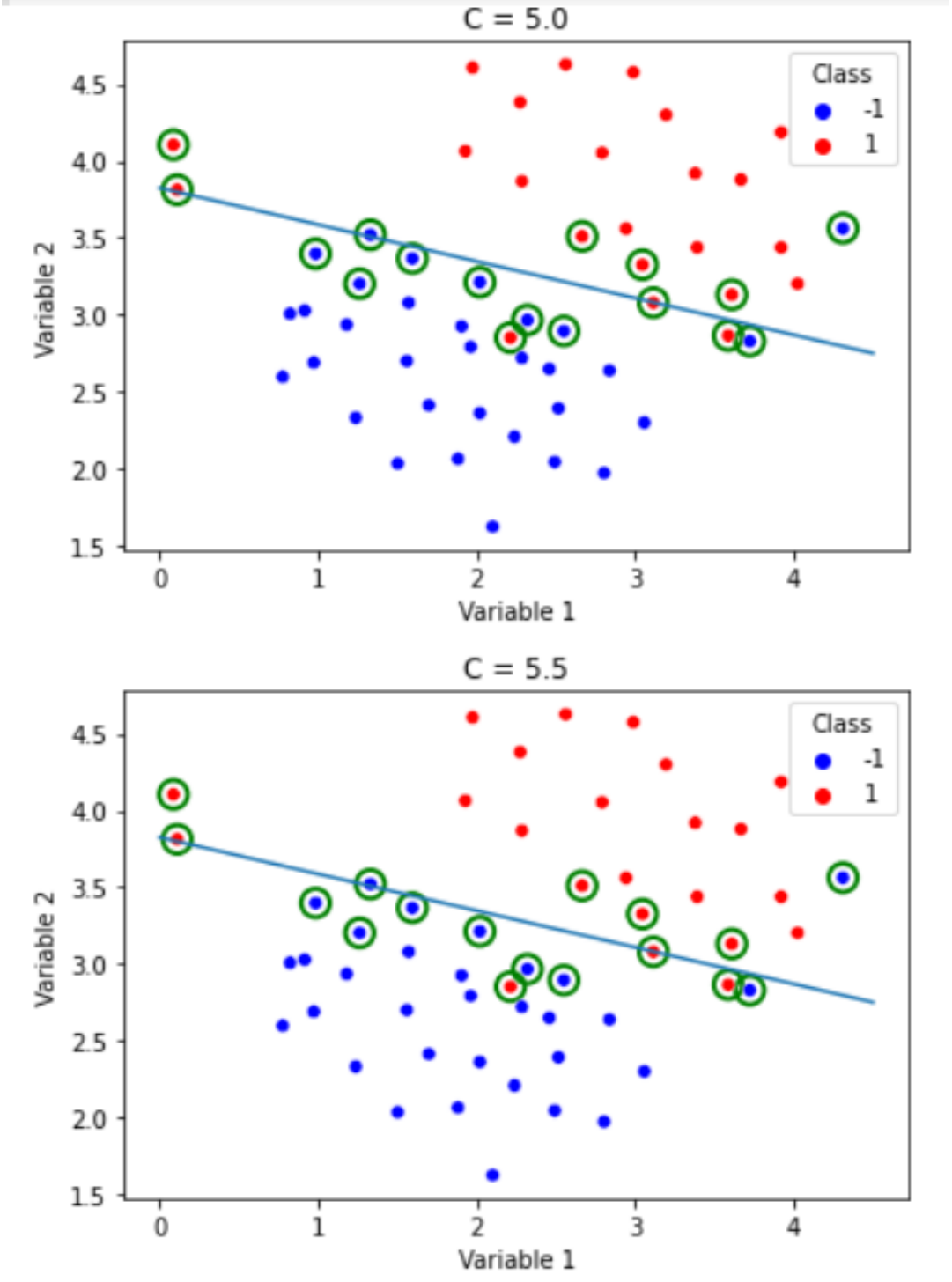

C = 2.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4
C = 2.5
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

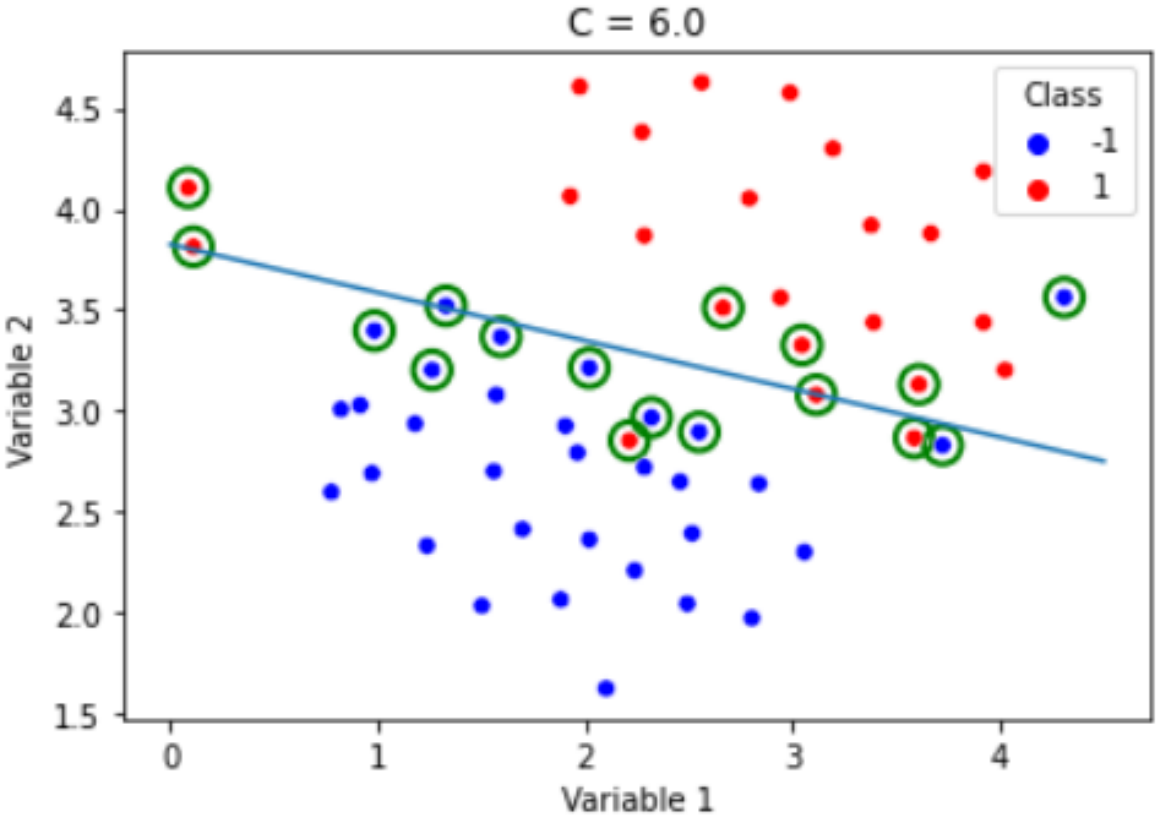

C = 3.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

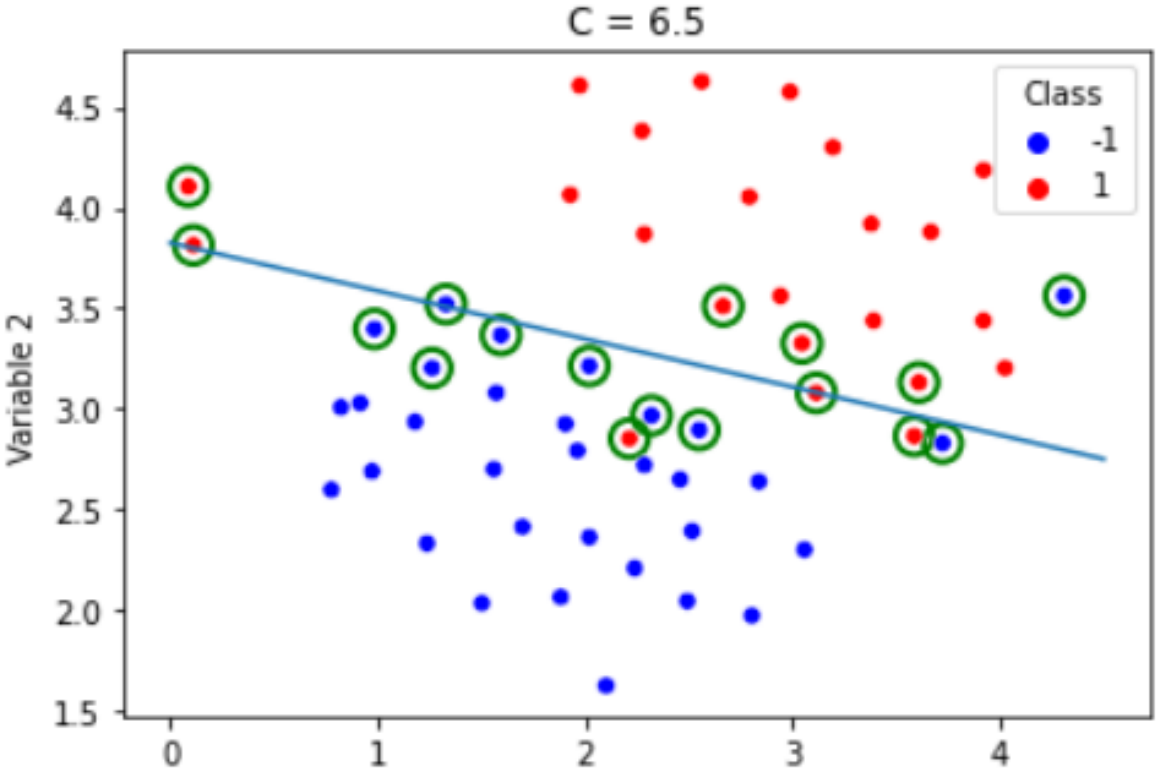

C = 3.5
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

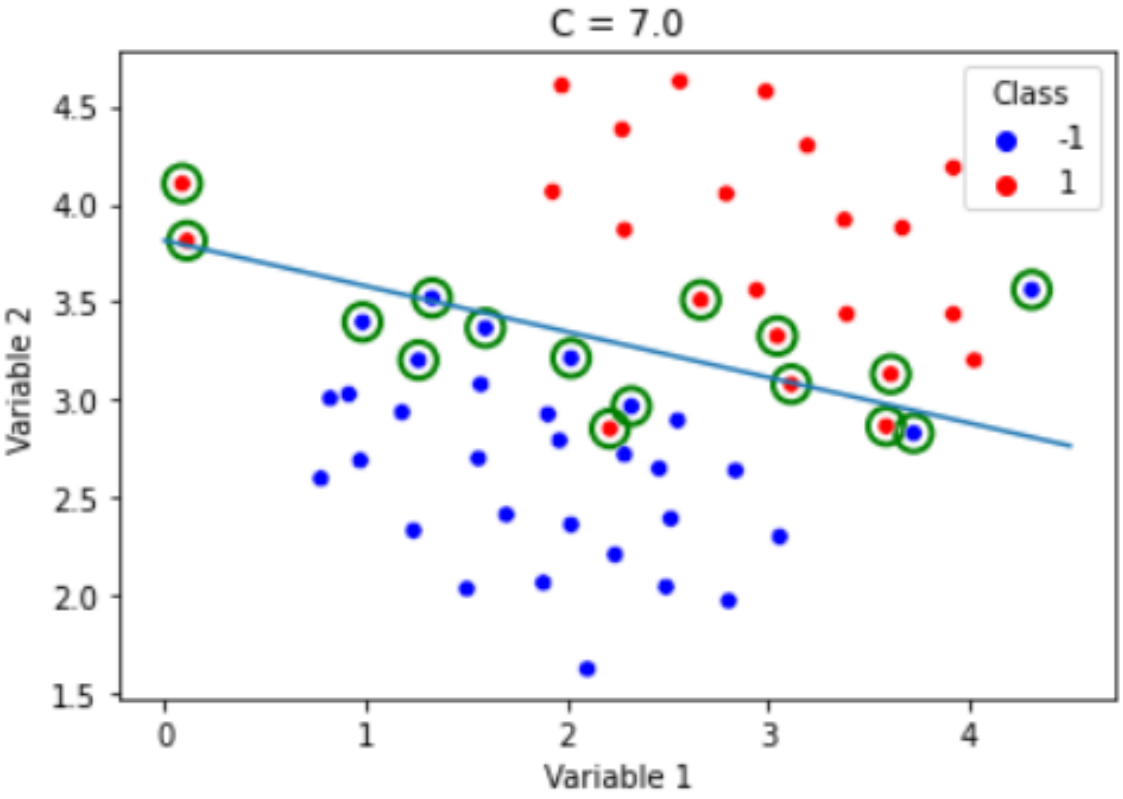

C = 4.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

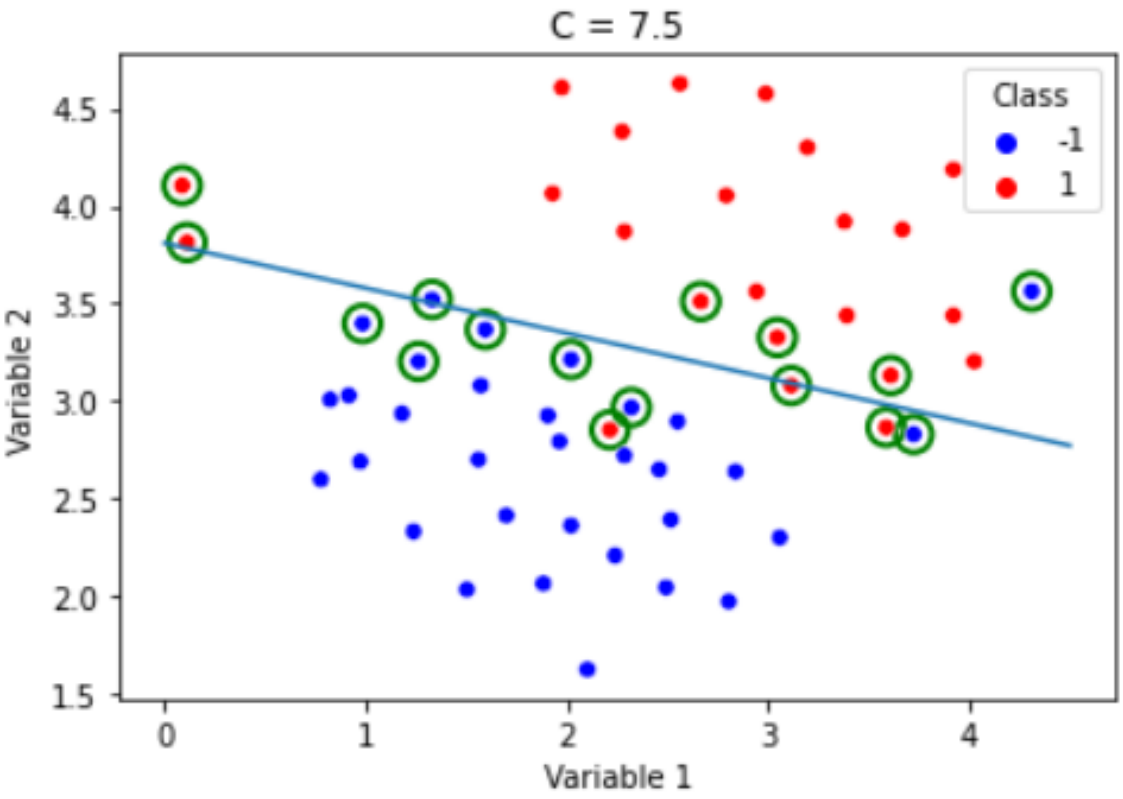

C = 4.5
Class
-1
1
Variable 2
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4

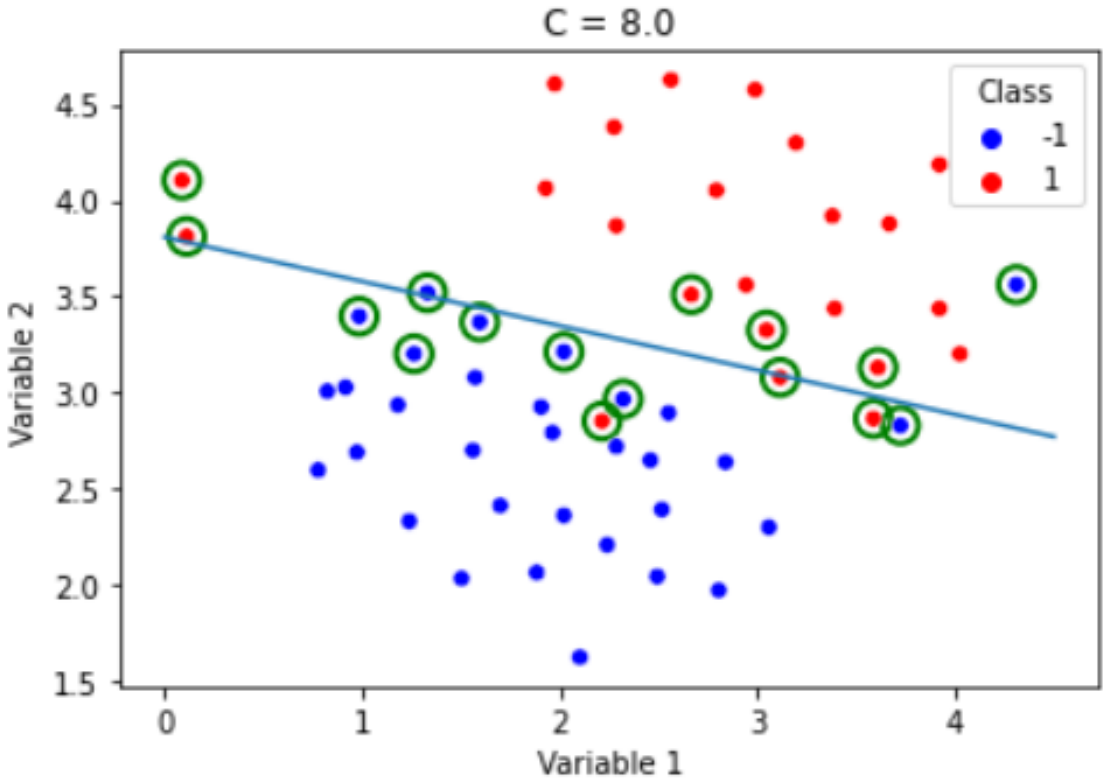

C = 5.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4
C = 5.5
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4


C = 6.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4


C = 6.5
Class
-1
1
Variable 2
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4


C = 7.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4


C = 7.5
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4


C = 8.0
Class
-1
1
Variable 2
Variable 1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
1
2
3
4