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Q2. Classification

Part (a) Perceptron learning Algorithm

Predicted weight = [-17.491825264096352, 16.76442185975007]

Confusion matrix of train data:

confusion matrix for training data is as below:

[[90. 0.]
[0. 110.]]

training accuracy in percentage:

100.0

Confusion matrix of test data:

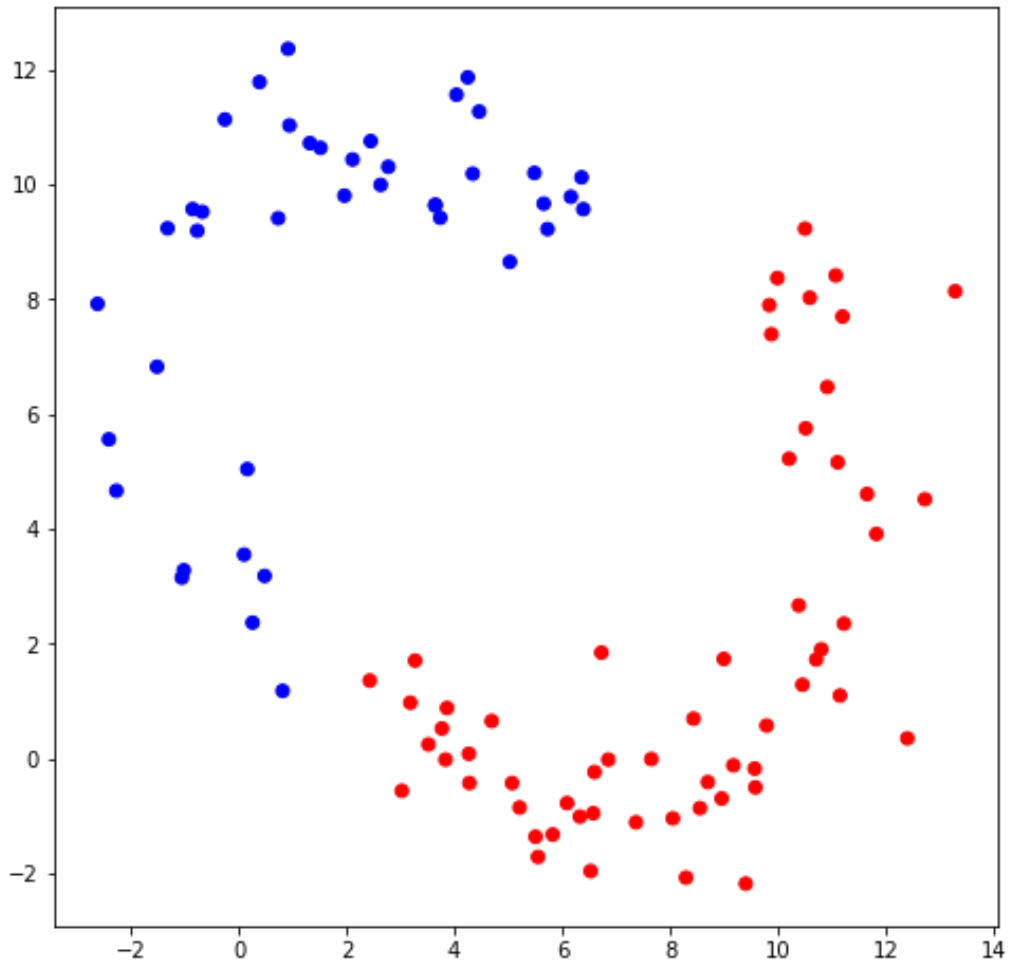
confusion matrix for test data is:

[[59. 0.]
[0. 41.]]

test accuracy in percentage:

100.0

Scatter plot of test data:



Decision Boundary:

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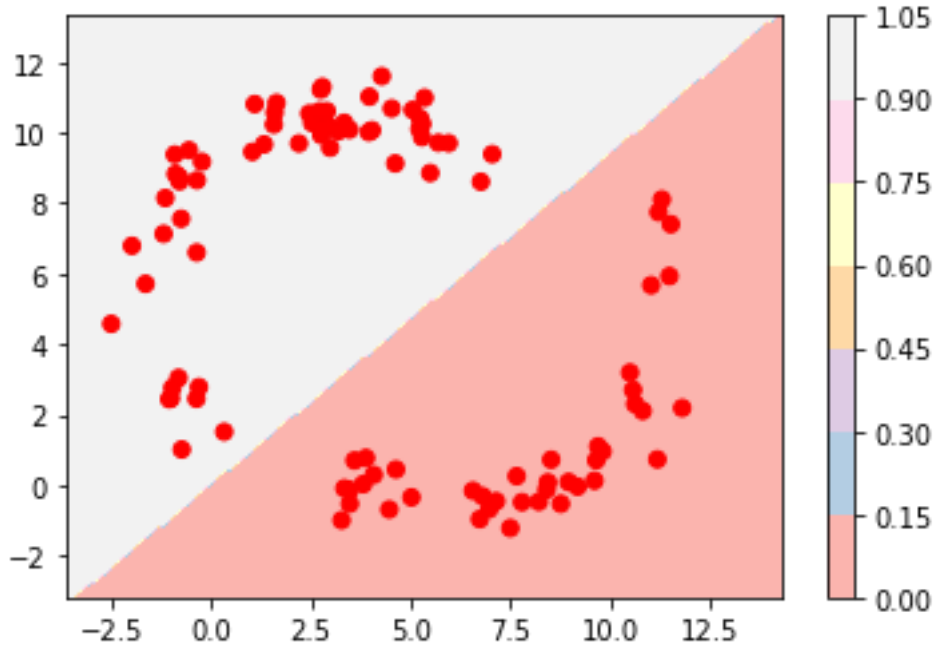

Part(b).
Covariance matrix for both classes are equal
Taking the covariance matrix as below:
[[16.28349919561478, 0], [0, 16.28349919561478]]

confusion matrix for test data is as below:

[[58. 1.]
[1. 40.]]

test accuracy in percentage:
98.0

confusion matrix for train data is as below:
[[90. 0.]
[0. 110.]]
training accuracy in percentage:
100.0

Scatter plot of test data after classification:

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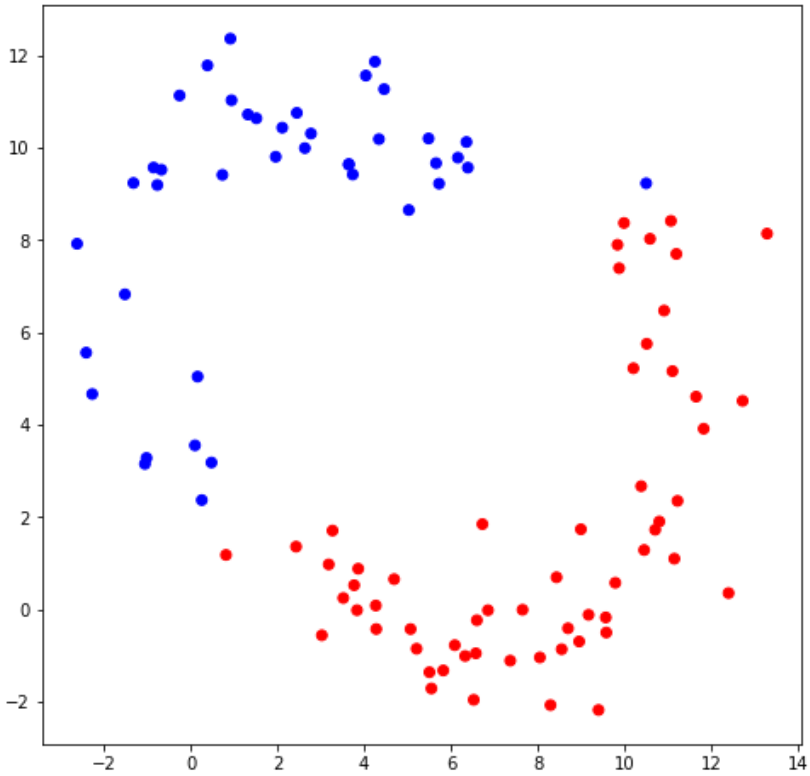
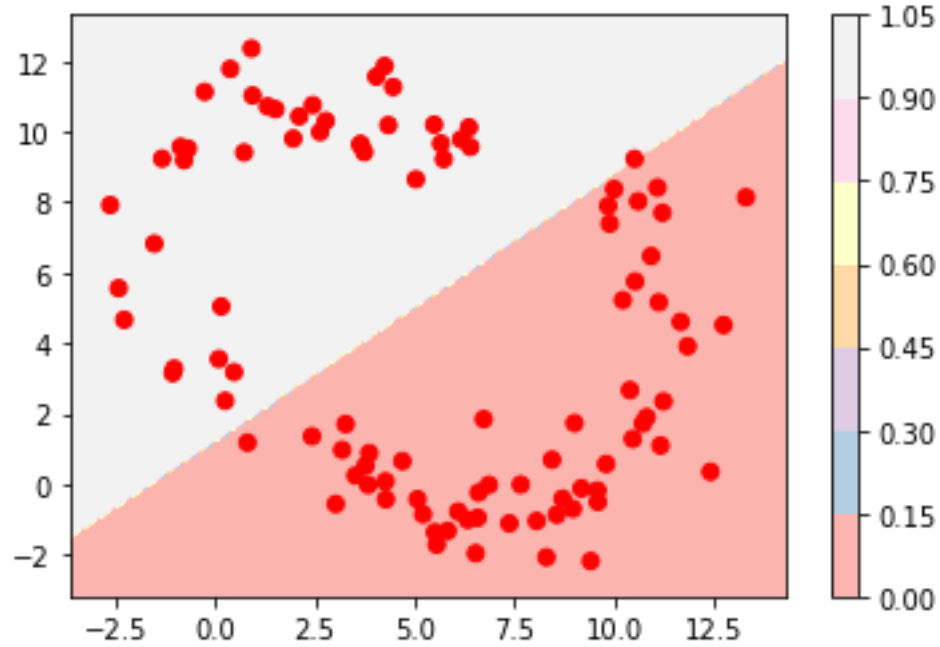


Decision boundary of test data:



Part(c). Training accuracy is 100%

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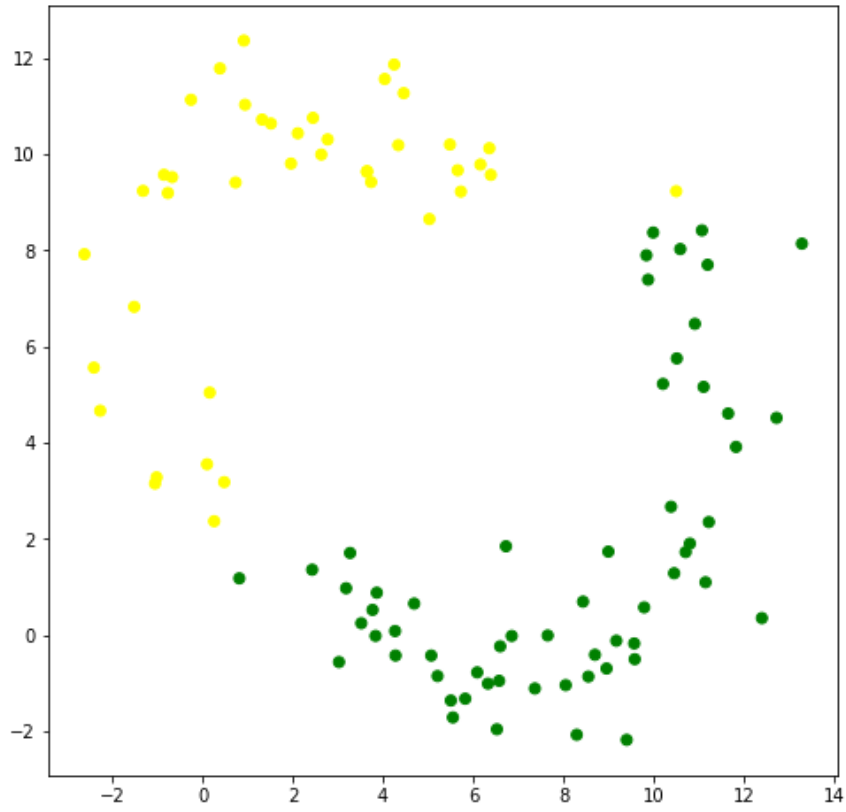
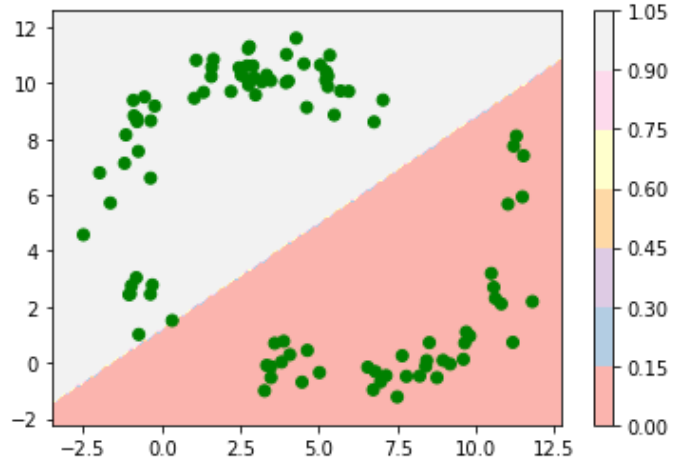
Covariance from training data: C1 = C2 = [[14.485080379789565, 0], [0, 19.955533021400562]]

Confusion matrix:
confusion matrix for test data is as below:
[[58. 1.]
[1. 40.]]
test accuracy in percentage:
98.0

Scatter plot of test data with class label:



Decision Boundary of test data:



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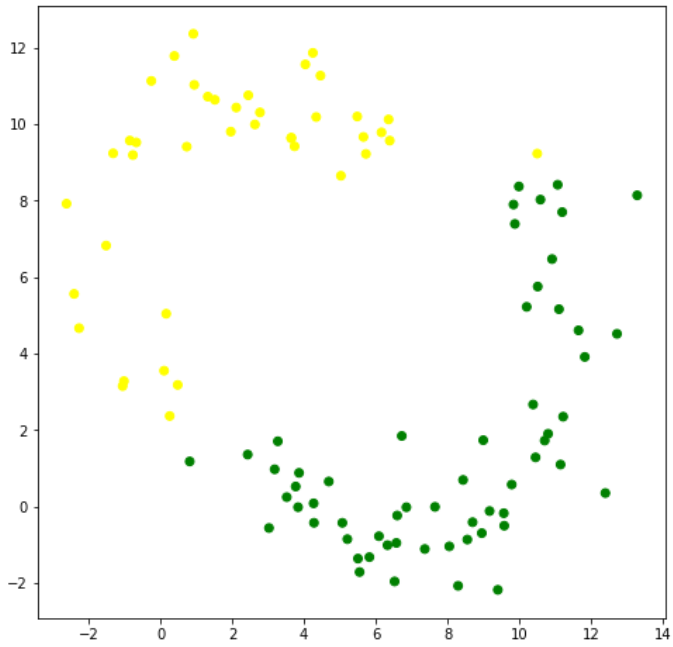
Part(d). Note : training accuracy is 100%
Covariance matrix C1 and C2 are:
C1 = [[7.19652856 4.46811773]
[4.46811773 7.31573156]]

C2 = [[6.882969 4.12203567]
[4.12203567 6.66585842]]

Confusion matrix:
confusion matrix for test data is as below:
[[58. 1.]
[1. 40.]]
test accuracy in percentage:
98.0

Scatter plot of test data with class label:



Decision boundary:

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