**Lab 5 – Support Vector Machine**

1. Suppose that the following are a set of points in two classes:





Plot them and find the optimal separating line. What are the support vectors, and what is

the margin?

1. Use Perceptron code to classify the data in #1. Compare the classification line with the corresponding classification line that you obtained with SVM in problem 1. Explain the differences between the classification line and corresponding M’s for both cases.
2. Now consider the following non-linear labeled data:

Positive labels –



Negative Labels



Now use the following transformation function to transform the data so that it becomes linear:



Show your transformed data and classify using straight lines.

1. Consider 2 circles – an inner circle surrounded by an outer circle. Obviously, they cannot be classified with SVM. However, you can apply the Kernel Trick (use a polynomial K) to convert the data into a higher dimensional space (3 in this case) – you can use np.dot etc to transform the data.
2. Use equations for an outer circle and make say 10 data points on the circle. Do the same for an inner circle.
3. Apply a polynomial Kernel to convert the data. Then plot the data.
4. Run SVM on data in 4b (optional).