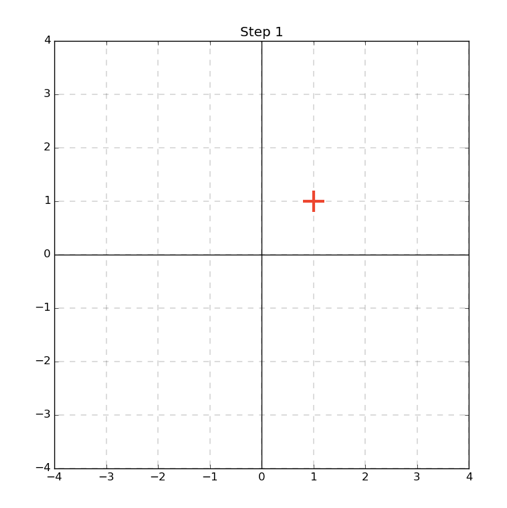
Michael Lee

HW #3

Perceptron

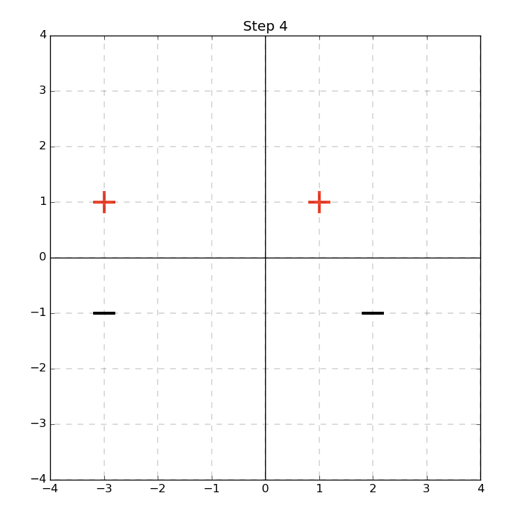
1.







2. Our learned perceptron does not draw the maximized margin. We see that if we pick the line x[2]=0 we get a maximized margin of 1.



3.

Max Mistakes =

SVMs: Hinge Loss and Mistake Bounds

1.

Here we see that the function is convex because if we take any two points (as shown in the orange) that any line we draw will be greater than or equal to the minimum.

2. For a fixed we take on the values 0,1 because we regularize w such that

3. We consider the bound in two cases:

-In the best case M(w) equals 0 and the classification is therefore 0.

So we have:

We can observe that the minimum value of would be for the function to return 0. And hence we would get-> so the upper bound holds.

-In the best case M(w) equals N we have:

**Kernel Functions and Linear Separability**

\*We multiply out terms to get:

We recognize that this equation represents a four dimensional plane because the vector represented has linear coefficients, that is: .

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**Programming Question**