Homework 5

Due: 14 April 2022

Problem 5.1

Consider the following data set:

$$\langle 0, 10 \rangle : +$$
$$\langle 10, 0 \rangle : +$$
$$\langle 0, -10 \rangle : -$$
$$\langle -10, 0 \rangle : -$$
$$\langle -10, 10 \rangle : +$$
$$\langle 10, 10 \rangle : +$$
$$\langle 10, -10 \rangle : -$$
$$\langle -10, -10 \rangle : -$$

If you train a simple perceptron, with initial weights of 0 (instead of randomly generated) and learning factor $\alpha = 0.5$, during what epoch (iteration through the data—i.e. the while loop) would it converge? What would be the final weight vector? Show your work by showing the initial weight vector $\hat{W}_{init} = \langle 0, 0, \theta = 0 \rangle$ and the weight vector after each correction. Draw a diagram including the weight vector and a dotted line representing the separator implied by your θ value.

Collaboration policy: group work! If you work with other people on this homework, hand in one copy and put all your names on top. There will be a revision cycle for this.