

Name:

NetID:

1.) Given the following perceptron and samples  $S_1$  and  $S_2$  with two features, classify the points using the perceptron and run through an iteration of the weight updates for each misclassified sample. Assume the activation function is the heaviside step function we saw in class, outputting either a -1 or a 1.

$$w = (0.5, 1, 0.6)$$

$$x = (1, x_1, x_2)$$

$$\eta = 0.4$$

$$f(w^T x)$$

$$S_1 = (1, 1), Y = -1$$

$$S_2 = (-1, -1), Y = 1$$

$$S_1: 0.5(1) + 1(1) + 0.6(1) = 2.1 \rightarrow 1 \times$$

$$S_2: 0.5(1) + 1(-1) + 0.6(-1) = -1.1 \rightarrow -1 \times$$

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$$S_1: w'_0 = 0.5 + (0.4)(1) = 0.9$$

$$w'_1 = 1 + (0.4)(1)(-1) = 0.6$$

$$w'_2 = 0.6 + (0.4)(-1)(1) = 0.2$$

$$S_2: w'_0 = 0.9 + (0.4)(1) = 1.3$$

$$w'_1 = 0.6 + (0.4)(1)(-1) = 0.2$$

$$w'_2 = 0.2 + (0.4)(1)(-1) = -0.2$$

$$w' = (1.3, 0.2, -0.2)$$