CS691 Quiz 5 Name _____

1. We are training a neuron using the perceptron algorithm. We have one feature, x_1. For some sample, s, with label $y = 1$, we get $a < 0$. Using the update rules for the perceptron, show that we will do better on sample s after we update w and b. (3 points)

2. Given a neuron with parameters $w = [0, 1, 1]$ and $b = 1$, which of the following points are on the decision boundary for the neuron? How do you know? (3 points)
   $p_1 = (1, 2, 3)$
   $p_2 = (1, 2, -3)$
   $p_3 = (8, -1, 0)$
   $p_4 = (2, 6, -8)$
   $p_5 = (3, -2, 1)$

3. Using the training data below, train a neuron using the perceptron algorithm for two epochs. Use initial $w = [0, 0]$ and $b = 0$. Give the final w and b. Iterate through the points in the order presented above. What are the w and b after two epochs?(4 points)

Sample	x_1	x_2	Label
s_1	0	0	-1
s_2	1	1	1
s_3	0	1	-1
s_4	2	2	1
s_5	1	0	-1
s_6	1	2	1

CS491 Quiz 5 Name _____

1. A model trained with the perceptron algorithm is guaranteed to give you 100% accuracy on the training data. True or false. Circle one and explain (2 points)

2. Given D features, how many parameters does our neuron have? Explain. (2 points)

3. We have trained a neuron using the perceptron algorithm until convergence. Our resulting weights are $w = [10, 5, -4, 3, 2, 0]$ and $b = 0$. Which feature, $x_1, x_2, x_3, x_4, x_5, x_6$ would you say is the most important? Why? (2 points)

4. Using the training data below, train a neuron using the perceptron algorithm for two epochs. Use initial $w = [0, 0]$ and $b = 0$. Give the final w and b. Iterate through the points in the order presented above. Give the w and b after two epochs. (4 points)

Sample	x_1	x_2	Label
s_1	0	0	-1
s_2	1	1	1
s_3	0	1	-1
s_4	2	2	1
s_5	1	0	-1
s_6	1	2	1