CS 422/622 Quiz 4 Name Solution

1. Run the perceptron algorithm on the following training data in the order it is provided.

sample	x_1	x_2	label
s_1	-1	-1	-1
s_2	-1	1	1
s_3	1	-1	1
s_4	1	1	1

Table 1: Training data.

$w = (0, 0)$
$b = 0$

Epoch 1

$a_1 = 0 \cdot -1 + 0 \cdot -1 + 0 = 0$ $\quad 0 \cdot -1 \leq 0$ update
$w = (1, 1)$ $b = -1$

$a_2 = -1 \cdot 1 + 1 \cdot 1 - 1 = -1$ $\quad -1 \cdot 1 \leq 0$ update
$w = (0, 2)$ $b = 0$

$a_3 = 0 \cdot 1 + 2 \cdot -1 + 0 = -2$ $\quad -2 \cdot 1 \leq 0$ update
$w = (1, 1)$ $b = 1$

$a_4 = 1 \cdot 1 + 1 \cdot 1 + 1 = 3$ $\quad 3 \cdot 1 \geq 0$ no update

Epoch 2

$a_1 = 1 \cdot -1 + 1 \cdot -1 + 1 = -1$ $\quad -1 \cdot -1 > 0$ no update

$a_2 = -1 \cdot 1 + 1 \cdot 1 + 1 = 1$ $\quad 1 \cdot 1 > 0$ no update

$a_3 = 1 \cdot 1 + 1 \cdot -1 + 1 = 1$ $\quad 1 \cdot 1 > 0$ no update

$a_4 = 1 \cdot 1 + 1 \cdot 1 + 1 = 3$ $\quad 3 \cdot 1 > 0$ no update

Done

$w = (1, 1)$ $b = 1$

$w = w + yx$

$b = b + y$