OR Gate

Assume you have a perceptron with two inputs denoted by x1 and x2, and a threshold corresponding to a fixed input denoted by x0=-1.

The perceptron is based on a step activation function of output values zero for negative inputs and one otherwise.

Starting with the initial weights w1 = +0.3, w2 = -0.1, and an initial threshold w0 = 0.2, calculate all the steps and weight adjustments involved with its training to learn a two-input OR problem.
To achieve this, use the Perceptron training algorithm with a learning rate η=0.1

yo = step ($x1w1$ + $x2w2$ - $w0$)

yo = step ($x1w1$ + $x2w2$ -0.2)

$e = yd - yo$
$w1(t + 1) = w1(t) + \eta ex1$
$w2(t + 1) = w2\ (t) + \eta ex2$

Solution

Epoch number 1

w1	w2	x1	x2	yd	y0	e	w1	w2
0.30	-0.100	0	0	0	0	0.30	-0.10	
0.30	-0.100	1	1	0	1	0.30	0.00	
0.30	0.00	1	0	1	1	0	0.30	0.00
0.30	0.00	1	1	1	1	0	0.30	0.00

Epoch number 2

w1	w2	x1	x2	yd	y0	e	w1	w2
0.30	0.00	0	0	0	0	0	0.30	0.00
0.30	0.00	0	1	1	0	1	0.30	0.10
0.30	0.10	1	0	1	1	0	0.30	0.10
0.30	0.10	1	1	1	1	0	0.30	0.10

Epoch number 3

w1	w2	x1	x2	yd	y0	e	w1	w2
0.30	0.10	0	0	0	0	0	0.30	0.10
0.30	0.10	0	1	1	0	1	0.30	0.20
0.30	0.20	1	0	1	1	0	0.30	0.20
0.30	0.20	1	1	1	1	0	0.30	0.20

Epoch number 4

w1	w2	x1	x2	yd	y0	e	w1	w2
0.30	0.20	0	0	0	0	0	0.30	0.20
0.30	0.20	0	1	1	1	0	0.30	0.20
0.30	0.20	1	0	1	1	0	0.30	0.20
0.30	0.20	1	1	1	1	0	0.30	0.20

Finally,

$x1$ OR $x2$ = step (0.3*$x1$ + 0.2$x2$ -0.2)