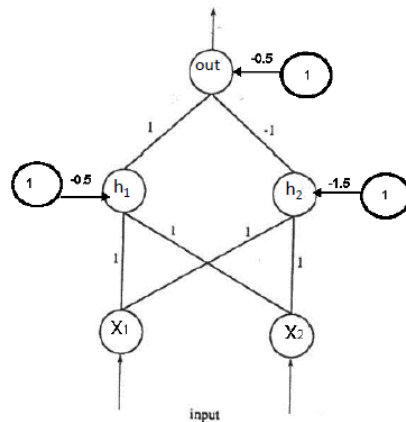


Chris Sutton

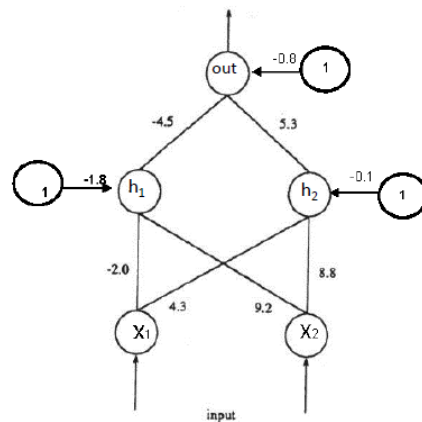
HW1

Q.1 For the following two networks show if they solve the XOR problem by constructing (a) their decision regions (see my XOR course notes), and (b) their truth tables for the networks (need h_1 and h_2 values).

Note that the bias of each neuron is the threshold, and it is subtracted from the net input. For instance, in the first network the output for the neuron h_1 is $h_1 = \text{Step}(x_1 + x_2 - 0.5)$. Activation function is the **Step function** for all the neurons.



Input	Output
00	0
01	1
10	1
11	0



Input	Output
00	0
01	1
10	1
11	0

Network 1 Math

$$H1 = \text{Step}(X1 + X2 - .5)$$

$$H2 = \text{Step}(X1 + X2 - .15)$$

$$\text{Out} = \text{Step}(H1 - H2 - .5)$$

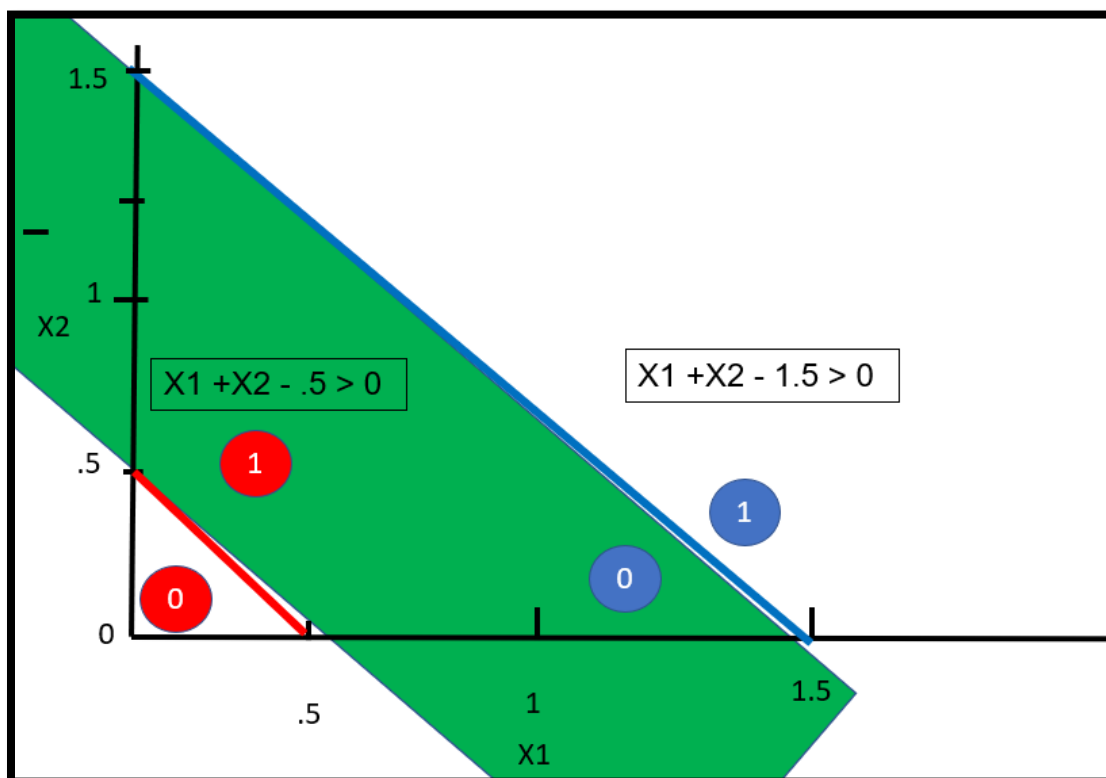
Where Step is:

$$f(S_j) = \begin{cases} 0 & \text{if } S_j \leq 0 \\ 1 & \text{if } S_j > 0 \end{cases}$$

Truth Table – Network 1

X1	X2	H1	H2	Out
0	0	0	0	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	0

Decision Region – Network 1



Network 2 Math

$H1 = \text{Step}(-2X1 + 9.2X2 - 1.8)$ note: $x2 - .21x1 - .19 > 0$

$H2 = \text{Step}(4.3X1 + 8.8X2 - .1)$ note: $x2 + .48x1 - .011 > 0$

$\text{Out} = \text{Step}(-4.5H1 + 5.3H2 - .8)$

Truth Table – Network 2

X1	X2	H1	H2	Out
0	0	0	0	0
0	1	1	1	1
1	0	0	1	1
1	1	1	1	0

Decision Region – Network 1

