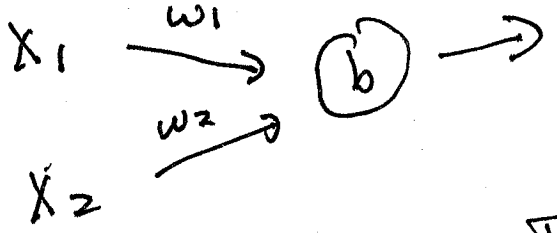
HW9 - LADS-520

(1) (a) Give the weights and bias for a one neuron network



using activation function σ_S (the step) so your net classifies

(0,0), (1,0), (0,1) as ~~value~~ output = 1

(1,1) as output = 0

[This is the NAND gate, BTW]

(b) Prove or disprove: There is a one neuron net that classifies the same data using activation function σ_R (the ramp).

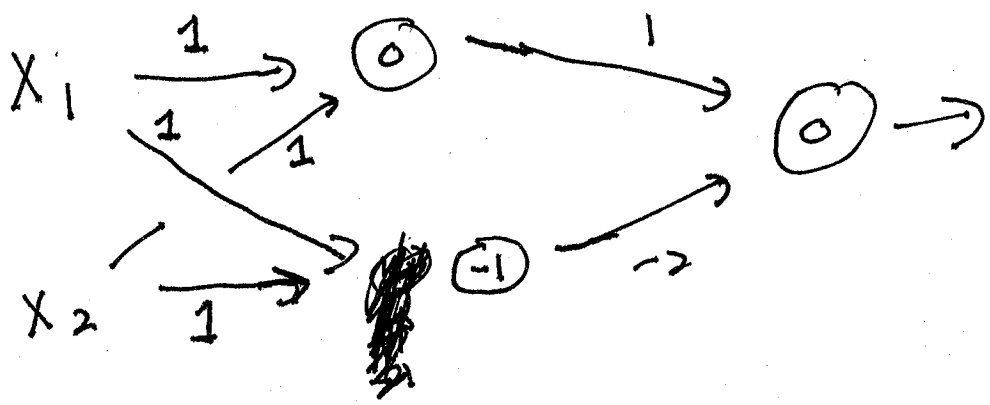
(2) Consider the classification

(0,0), (1,1) as output = 0
(1,0), (0,1) as output = 1

[This is the XOR gate, BTW]

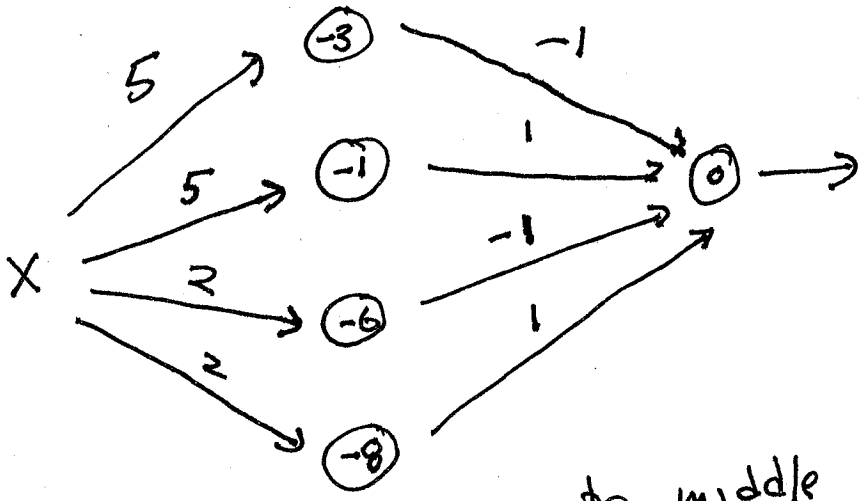
(a) Show that a single neuron net as in problem 1(a) could not classify this data.

(b) Show that this net, with no activation on the output neuron, does classify the data



The hidden layer has ramp activation function.

(3) Consider the network



with sigmoid activation on the middle layer and no activation on the output layer. Thus the input-output function has the form

$$S(x) = \sum_{i=1}^{4} \gamma_i \sigma(W_i x + b_i) \text{ with}$$

$$\sigma(x) = \frac{1}{1+e^{-x}}$$

(a) Write a program to compute $S(x)$

(b) Plot $S(x)$ on the interval $[0, 6]$

As usual, include your code and the figure in your soln.