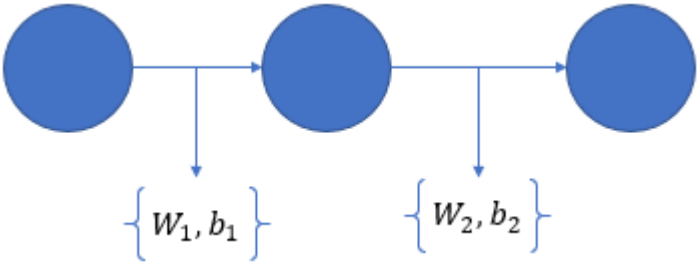
Participation 6

July 17, 2023

Assumption: The output neuron is also counted as one neuron as discussed in Thursday Office Hour.

1 Part1



Let $W_1 = a, W_2 = b$. The formula for the out put Neuron is

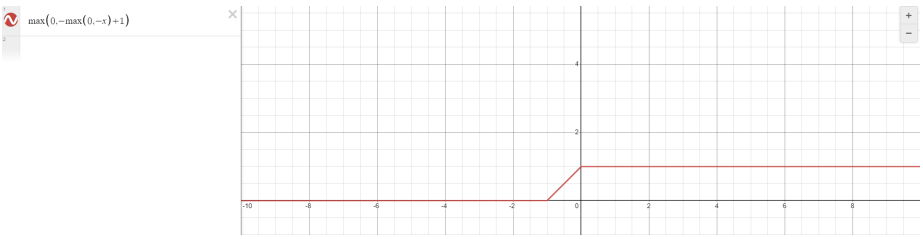
$$\sigma(W_2\sigma(W_1x + b_1) + b_2)$$

$$= \sigma(b\sigma(ax + b_1) + b_2)$$

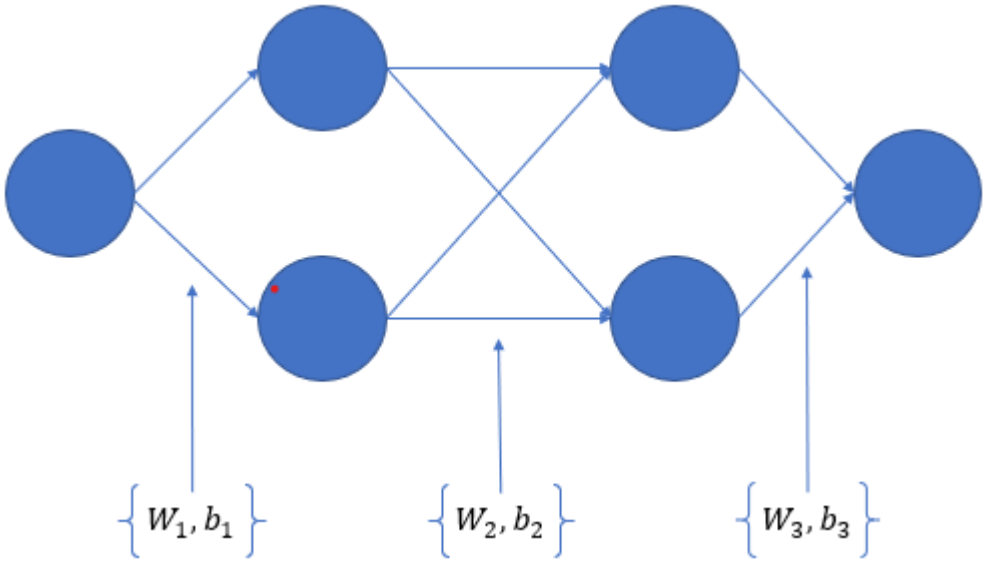
Let $a = -1$,$b = -1$,$b_1 = 0$, and $b_2 = 01$, We have:

$$\sigma(-\sigma(-x) + 1)$$

The plot is therefore:



2 Part2



Let $W_1 = \begin{bmatrix} a \\ b \end{bmatrix}, W_2 = \begin{bmatrix} c & d \\ e & f \end{bmatrix}, W_2 = \begin{bmatrix} g \\ h \end{bmatrix}, b_1 = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}, b_2 = \begin{bmatrix} b_3 \\ b_4 \end{bmatrix}, b_3 = \begin{bmatrix} b_5 \\ b_6 \end{bmatrix}$.
The formula for the out put Neuron is

$$\sigma(W_3\sigma(W_2\sigma(W_1x + b_1) + b_2) + b_3)$$

$$= \sigma(g(\sigma(c\sigma(ax+b_1)+d\sigma(bx+b_2)+b_3))+h(\sigma(e\sigma(ax+b_1)+f\sigma(bx+b_2)+b_4))+b_5)$$

Let $g = 1$ and $a = -1$, $b_1 = 0$, $c = -1$, $b = 1$, $b_2 = 1$, $d = 1$
$h = 1$ and $e = 1$, $b_4 = 1$
$b_5 = -1$
We have: The plot is therefore: