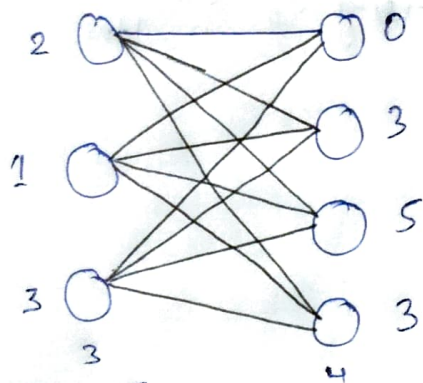


Exercise 2 → Four Neurons :-



$$\begin{aligned} b_1 &= -5 \\ b_2 &= 0 \\ b_3 &= 1 \\ b_4 &= -2 \end{aligned}$$

$4 \times 3 = 12$
4 rows 3 columns

$$x = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$$

$\phi: \text{ReLU}$

1	-1	1	-5
1	1	0	0
0	1	1	1
1	0	1	-2

$w \quad 4 \times 3 \quad b \quad 4 \times 1$

$\phi \approx$

$$\begin{bmatrix} 0 \\ 3 \\ 5 \\ 3 \end{bmatrix}$$

$$\begin{aligned} & 4 \times 3 \quad 4 \times 1 \\ & w \cdot x + b \\ & \rightarrow (4 \times 3)(3 \times 1) + (4 \times 1) \\ & (4 \times 1) + (4 \times 1) \\ & = (4 \times 1) \end{aligned}$$

(16) parameters

⇒ Every Neurons will have one output.
weight

$$\begin{aligned} 2(1) &= 2 \\ 1(-1) &= -1 \\ 1(3) &= 3 \\ \frac{3}{4} + (-5) &= -1 \end{aligned}$$

$$\begin{aligned} 2(1) &= 2 \\ 1(1) &= 1 \\ 0(3) &= 0 \\ \frac{3}{3+0} &= 3 \end{aligned}$$

$$\begin{array}{r|l} N2 & N4 \\ \hline 0(2) = 0 & 1(2) = 2 \\ 1(1) = 1 & 0(1) = 0 \\ 1(3) = 3 & 1(3) = 3 \\ \hline \frac{4}{4} & \frac{5}{5} \\ + \frac{1}{5} & + \frac{-2}{5} \\ \hline \frac{5}{5} & \frac{3}{5} \end{array}$$

Also

$$\begin{matrix} & w & & x & & b \\ \begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix} & \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix} & + & \begin{bmatrix} -5 \\ 0 \\ 1 \\ -2 \end{bmatrix} & = & \begin{bmatrix} w_1x_1+b_1 \\ w_2x_2+b_2 \\ w_3x_3+b_3 \\ w_4x_4+b_4 \end{bmatrix} \end{matrix}$$

4×3 3×1

$$= \begin{bmatrix} 2(1) + (-1)(1) + 1(3) - 5 \\ 2(1) + 1(1) + (0)(3) + 0 \\ 0(2) + (1)(1) + 1(3) + 1 \\ (1)(2) + (0)(1) + 1(3) + (-2) \end{bmatrix}$$
$$= \begin{bmatrix} -1 \\ 3 \\ 5 \\ 3 \end{bmatrix} \approx \text{ReLU} = \begin{bmatrix} 0 \\ 3 \\ 5 \\ 3 \end{bmatrix}$$