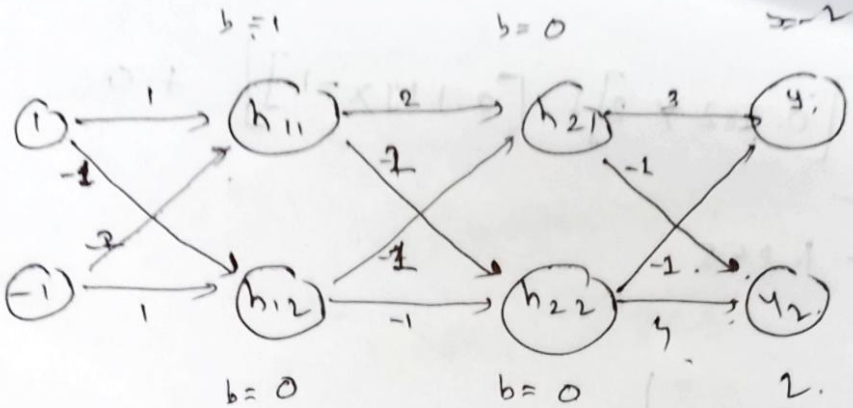
Q1]. Calculate MSE.



for (h_{11})

$$z = \left[[-1 \times -2] + [1 \times 1]\right] + b1$$

$$= 4.$$

$$f(z) = \frac{1}{1+e^{-z}} = 0.982$$

for h_{12}

$$z = [1 \times -1] + [-1 \times 1] + 0.$$

$$= -2.$$

$$f(z) = \frac{1}{1+e^{+2}} = 0.119$$

h_{21}

$$z = [[0.982 \times 2] + [0.119 \times -1]] + 0$$

$$= -1.845$$

$$f(z) = \frac{1}{1+e^{-z}}$$

$$= \frac{1}{1+e^{-1.845}} = 0.863$$

h_{22}

$$z = [0.982 \times -2] + [0.119 \times -1] + 0$$

$$= -2.083$$

$$f(z) = \frac{1}{1+e^{2.083}} = 0.1107.$$

y_1

$$z = ([0.863 \times 3] + [0.1107 \times -1]) + 2$$

$$= \cancel{4.4783} \quad \cancel{0.4783} \quad 0.4783$$

$$f(z) = \frac{1}{1+e^{-4.4783}} = \cancel{0.988} \; 0.6173$$

(42) $Z = [0.863 \times -1] + [0.1107 \times +4] + 2$

$= 1.5798$

$F(Z) = \frac{1}{1+e^{-1.5798}}$

$= 0.829$

$\therefore MSE = \frac{[0.62 - 0.6173]^2 + [0.83 - 0.829]^2}{2}$

$= 4.145 \times 10^{-6}$

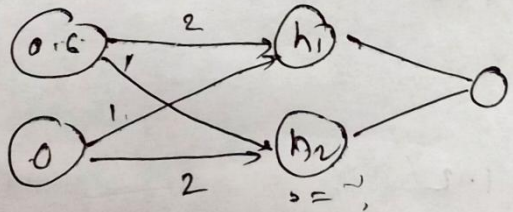
$= 0.0000041455$

Q1] Calculate the hidden for NAND and NOR MLP

Q3). Apply AF on the given inputs.

$X = \begin{bmatrix} 0.6 \\ 0 \end{bmatrix}$ $W = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ $b = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$b=0$



$h_2 =$

(h2) $[0.6 \times 1] + [0 \times 1] + 1$

$= 0.6 - 1$

$= -0.4$

$Relu[0.4, 0] = 0$

$b = [1.2 + (0)]$

$= 1.2$

(1) Relu

(h1) $\Rightarrow$ $Z = [0.6 \times 2] + [0 \times 1] + 0$

$= 1.2$

$F(Z) = \max(1.2, 0) = 1.2$

(2) leaky ReLu $\alpha = 0.1$.

(h1) $z = 1.2$.

$\therefore$ leaky ReLu = if $x > 0$ x
if $x < 0$ $x \times \alpha$

$= 1.2$.

(h2) $z = -0.4$

leaky $x_4 = -0.4 \times 0.1$

$= -0.04$

(3) (h1)

$\tanh = \left(\frac{2}{1 + e^{-2(1.2)}} \right) - 1 = 0.833$

(h2)

(h2) $= \left(\frac{2}{1 + e^{-2(-0.4)}} \right) - 1 = -0.379$

(4)

y1 $f(z) = \frac{1}{1 + e^{-x}} = \frac{1}{1 + e^{-1.2}} = 0.768$

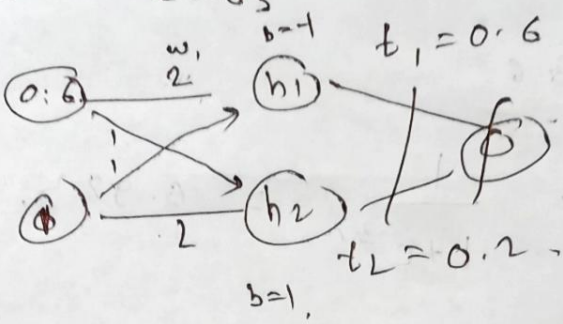
y2 $f(b) = \frac{1}{1 + e^{-(0.4)}} = \cancel{0.598}\ 0.401$

(5) linear

$y = z = 1.2$

$y = z = -0.4$.

Q4]. update the weights using delta rule for 2 iteration. $\eta = 0.3$



(ni).

$$z = \left[[0.6 \times 2) + [1 \times 1] \right] + (-1)$$

$$= 1.2 + 1 - 1$$

$$= 1.2$$

$$f(z) = \frac{1}{1+e^{-1.2}} = 0.768$$

$o_1 \neq t_1$.

$$\therefore \Delta w = \eta [t_1 - o_1] \times [x_1 \quad x_2]$$

$$= 0.3 [0.6 - 0.768] \quad [0.6 \quad 1]$$

$$= [0.3 \times [-0.168]] \quad [0.6 \quad 1]$$

$$= [-0.0302 \quad -0.0504]$$

$$w = [1.969 \quad 0.9496]$$

(w_1, w_2)

(4.2) $z = [0.6 \times 1] + [1 \times 2] + 1.$

$= .36$

$f(z) = \frac{1}{1+e^{-3.6}} = 0.973.$

$\therefore 0.1 \neq t.$

$\Delta w = 0.3 [0.2 - 0.973] [0.6 \quad 1]$

$= [-0.139 \quad -0.23]$

$w = [1 + (-0.139] \quad 2 + (-0.23)]$

$= [0.861 \quad 1.77]$