Assignment 1.1

$$z = w_0 + \sum_{i=1}^{n} w_i x_i$$

$$Relu = \max(0, z)$$

Find $\hat{y}$: $Sigmoid = \frac{1}{1 + e^{-z}}$

1st Layers iteration :

$$z_1 = w_0 + w_1 x_1 + w_2 x_2$$
$$= 3 + (3 \times -3) + (2 \times -1)$$
$$= 3 - 9 - 2$$
$$\boxed{z_1 = -8}$$

$$z_2 = 3 + (2 \times -2) + (3 \times -1)$$
$$= 3 - 4 - 3$$
$$\boxed{z_2 = -4}$$

$$z_3 = 3 + (3 \times -4) + (2 \times 0)$$
$$= 3 - 12$$
$$\boxed{z_3 = -9}$$

$$z_4 = 3 + (3 \times 0) + (2 \times -3)$$
$$\boxed{z_4 = -3}$$

Apply Activation Function :

$Z_1 = Relu(0, -8) = max(0, -8) = 0$

$Z_2 = Relu(0, -4) = max(0, -4) = 0$

$Z_3 = Relu(0, -9) = max(0, -9) = 0$

$Z_4 = Relu(0, -3) = max(0, -3) = 0$

2nd layers iteration

$Z_5 = 3 + (0 \times -4) + (0 \times 2) + (0 \times 4) + (0 \times 0)$

$\boxed{Z_5 = 3}$

$Z_6 = 3 + (0 \times -3) + (0 \times -5) + (0 \times 1) + (0 \times -1)$

$\boxed{Z_6 = 3}$

$Z_7 = 3 \times (0 \times -1) + (0 \times 3) + (0 \times 2) + (0 \times -3)$

$= 3 \times -10 + 0 + 0 + 0$

$\boxed{Z_7 = -30}$

$Z_7 = (3 \times 0) + (0) + (0)$

$\boxed{Z_7 = 3}$

Applying activation Functions

$z_5 = \text{Relu}(0,3) = \max(0,3) = 3$

$z_6 = \text{Relu}(0,3) = \max(0,3) = 3$

$z_2 = \text{Relu}(0,3) = \max(0,3) = 3$

$$\hat{y} = 3 + (3 \times -5) + (3 \times 4) + (3 \times -3)$$

$$= 3 - 15 + 12 - 9$$

$$= -12 + 12 - 9$$

$$\boxed{\hat{y} = -9}$$

$$\therefore \hat{y} = \frac{1}{1 + e^{-(-9)}} = \frac{1}{1 + e^{9}}$$

$$= \frac{1}{1}$$

$$\boxed{\hat{y} = 1}$$