Assignment 1

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BE CMPN A

Q1] $x = [1 \quad 0 \quad 0 \quad 1]$

$w = [0.2 \quad -0.3 \quad 0.5 \quad -0.4]$

Task 1:

$$g(x) = \sum x_i \cdot w_i - t$$

$$= [0.2 + 0 + 0 - 0.4] - t$$

$$= -0.2 - t$$

$$= -0.3$$

let the activation function be sigmoid

$$\therefore f(z) = \frac{1}{1 + e^{-(-0.3)}}$$

$$\therefore 0.42$$

$$\therefore f(z) \geq 0.42 < 0.5$$

$$\therefore \boxed{\text{output} = 0}$$

Task ②

→ The out put depends on the activation function's value, which depends on the $g(x)$ which is directly dependent on each input

Task 3

if $w = [0.2 \quad -0.3 \quad 0.5 \quad 0.1]$

$z = [0.2 + 0 + 0 + 0.1] \rightarrow 0.1$

$= 0.3 - 0.1 = 0$

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

$= 0.5$

$\therefore f(z) = 0.5$

$\therefore$ output = 1.

Q2]

$x_1 = 0 \,|\, 1$

$x_2 = 0 \,|\, 1$

$w = [0.7 \quad 0.3]$

Task 1

x_1	x_2	weighted sum	output
1	1	1	1
1	0	0.7	1
0	1	0.3	0
0	0	0	0

Task 2

- When ever obstacle is present the neuron activats

Task 3

- If we make $w = [0.5 \quad 0.5]$ then the neuron will only be active when $x = [1 \quad 1]$

Q3] $x = [2 \quad 1 \quad -2 \quad -1]$

$w = [-0.1 \quad 1 \quad 1 \quad 0.1]$

Task 1

$$z = -0.2 + 1 - 2 - 0.1$$

$$= -1.3$$

$$f(z) = \max(0, -1.3)$$

$$= 0$$

Task 2

By updaty weghts iterating, the network learns to prioritize significant sensor data.