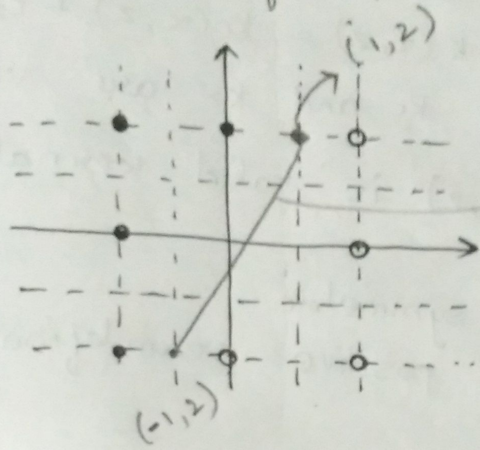
Q2) Perceptron Classifier :

a)



equation of decision boundary is

$$y - 2 = \frac{-2-2}{-1-1}(x-1)$$

$$y - 2 = 2(x-1)$$

$$y-2 = 2x - 2$$

$$y = 2x \quad \text{--- (1)}$$

let the decision boundary be

$$w_1 x_1 + w_2 x_2 + b = 0 \quad \text{--- (2)}$$

as both (1) and (2) is the equation of decision boundary so, lets compare both the equations we get -

$$b = 0$$

$$w_1 = 2$$

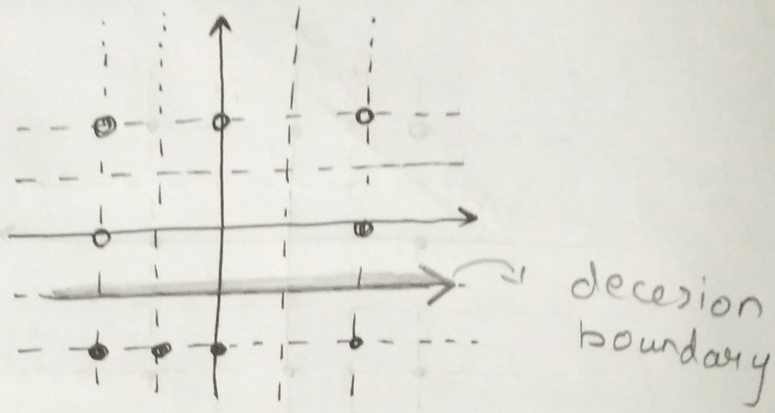
$$w_2 = -1$$

So,

bias $= 0$ and weight vector $= \begin{bmatrix} 2 \\ -1 \end{bmatrix}$

Q2)

b)



as seen from the diagram, our predicted decesion boundary is

$$\boxed{y = -1} \quad — (1)$$

and if we write the decision boundary as a function of w_1 and w_2 it is

$$w_1 x_1 + w_2 x_2 + b = 0 \quad — (2)$$

if we compare both equation (1) and (2)

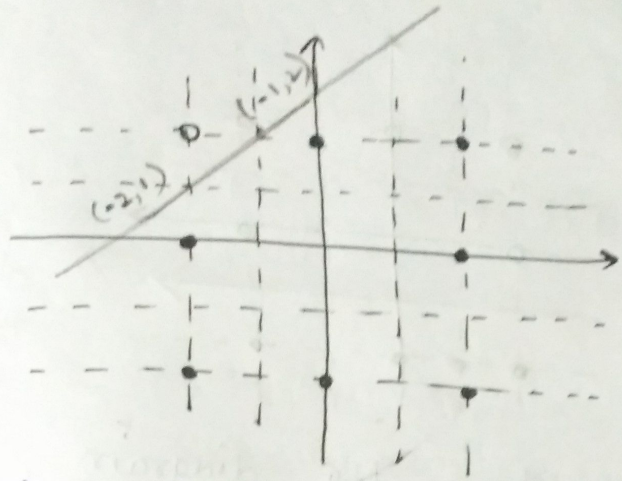
we get

$$b = 1$$
$$w_1 = 0$$
$$w_2 = 1$$

So,

bias = 0 and weight vector = $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$

c)



equation of decesion boundary

$$y - 2 = \frac{2-1}{-1+2}(x+1)$$

$$y - 2 = \frac{1}{1}(x+1)$$

$$y - 2 = x + 1 \quad \text{— (1)}$$

let the decision boundary be

$$w_1 x_1 + w_2 x_2 + b = 0 \quad \text{— (2)}$$

by comparing both the equation (1) and (2)

$$x - y + 3 = w_1 x_1 + w_2 x_2 + b$$

So, clearly

$$b = 3$$
$$w_1 = 1$$
$$w_2 = -1$$

So,

bias $= 3$, weight vector $= \begin{bmatrix} 1 \\ -1 \end{bmatrix}$