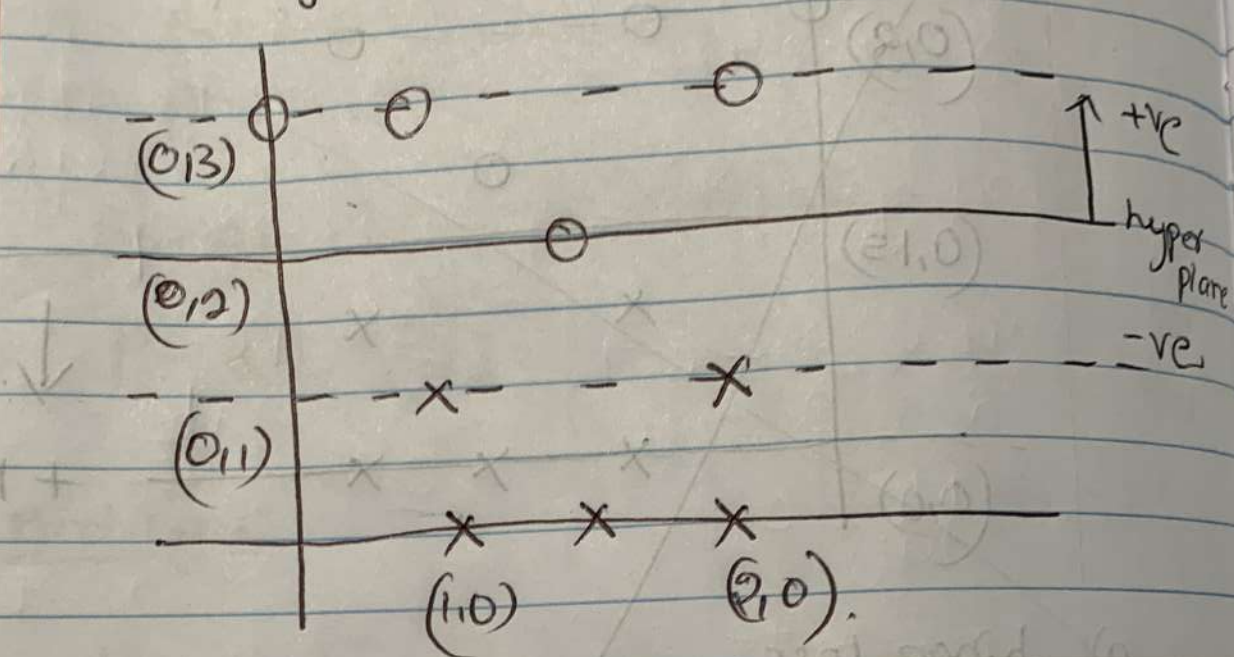


c) I didn't get SVM with $C=0.1$ the
 closes I got is 0.2 that is.



$$\text{hinge loss} = 9 + 4 + 7 = 20$$

$$0 = \beta_0 + \beta_1 \cdot 0 + \beta_2 \cdot 2 \rightarrow A$$

$$-1 = \beta_0 + \beta_1 \cdot 0 + \beta_2 \cdot 1 \rightarrow B$$

$$-1 = \beta_0 + \beta_1 \cdot 0 + \beta_2 \cdot 3 \rightarrow C$$

$$B - C \Rightarrow -2\beta_2 = -2$$

$$\beta_2 = 1.$$

$$A \Rightarrow \beta_0 + 2 \cdot 1 = 0$$

$$\beta_0 = -2.$$

Finding c .

$$\frac{13}{2} + 0 = \frac{1+4}{2} + 20c$$

↓
hard SVM

↓
this SVM.

$$\frac{8}{2} = 20c.$$

$$c = 1/5 = 0.2.$$

d) No, it's not the same model as before (hard margin SVM). here the hyperplane is

$$y = -2 + x_2 \rightarrow \text{with 9 misclassifications}$$

where as in case of hard margin SVM, the hyperplane is

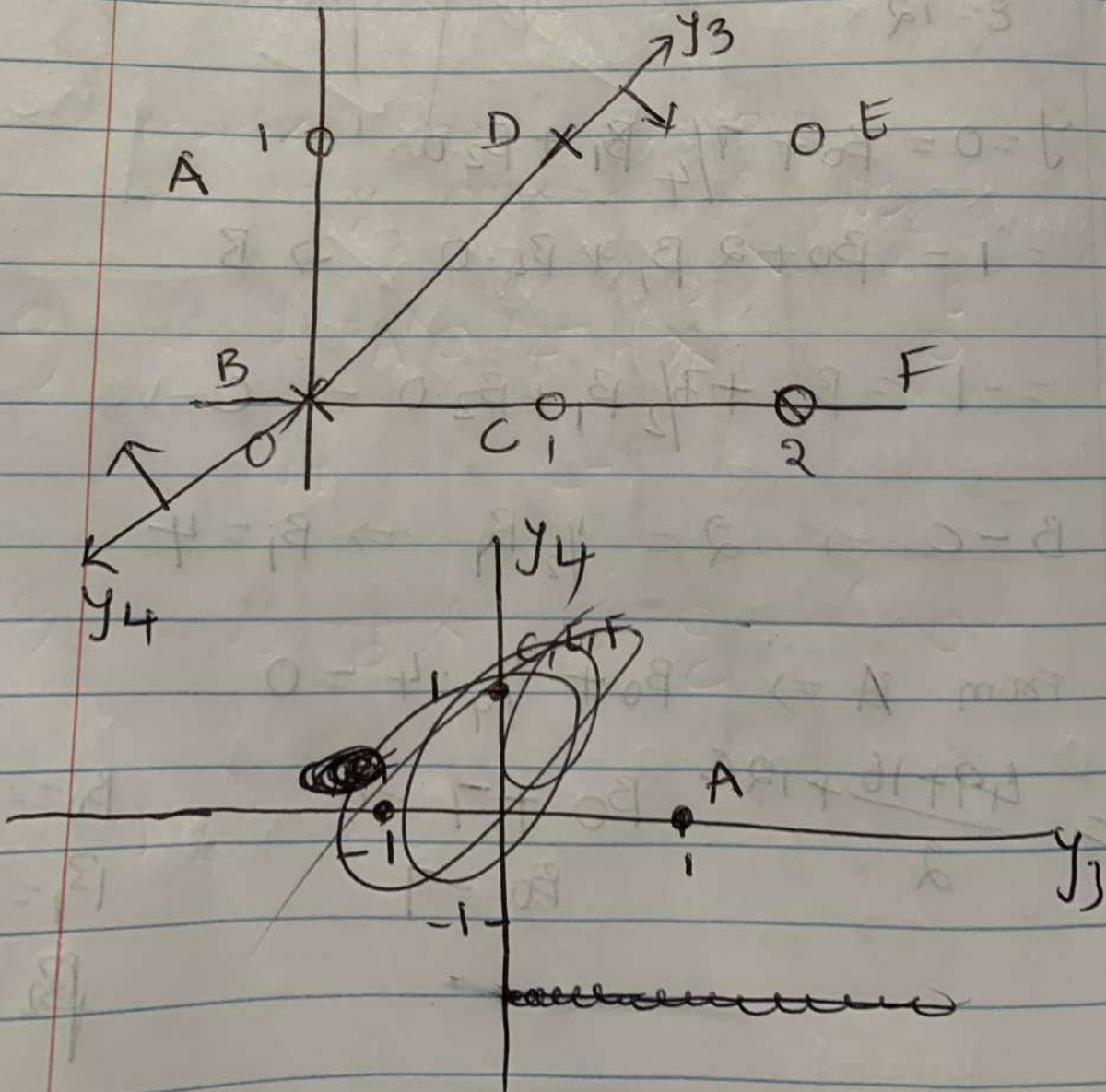
$$y = 3 - 2x_2.$$

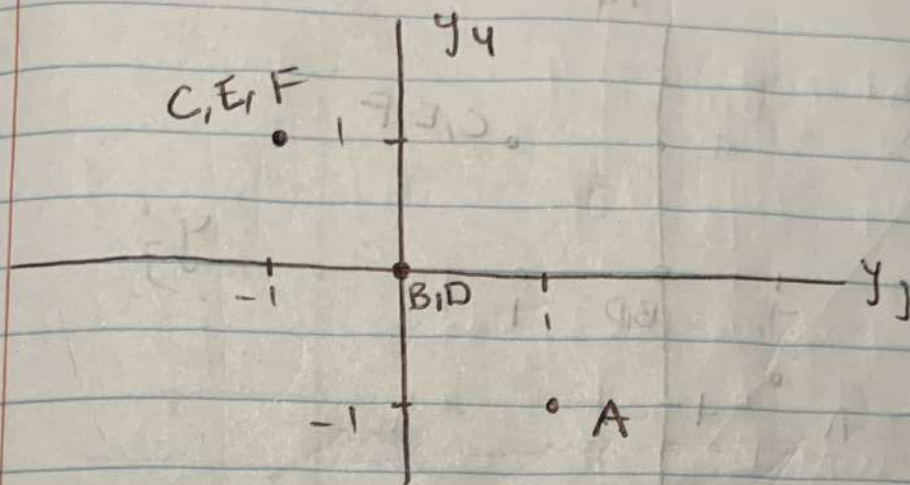
→ with 0 misclassifications

3) activation function: Sign

$$\text{Sign}(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases}$$

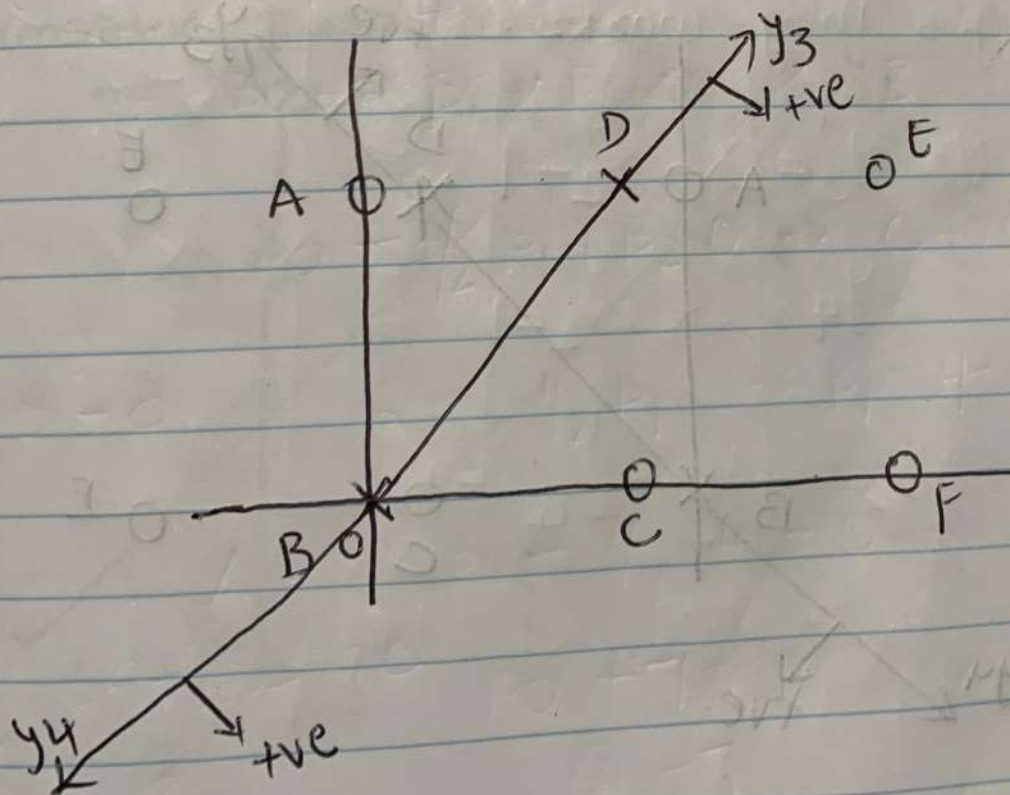
positive x points are all on the boundary. - consider following scenario

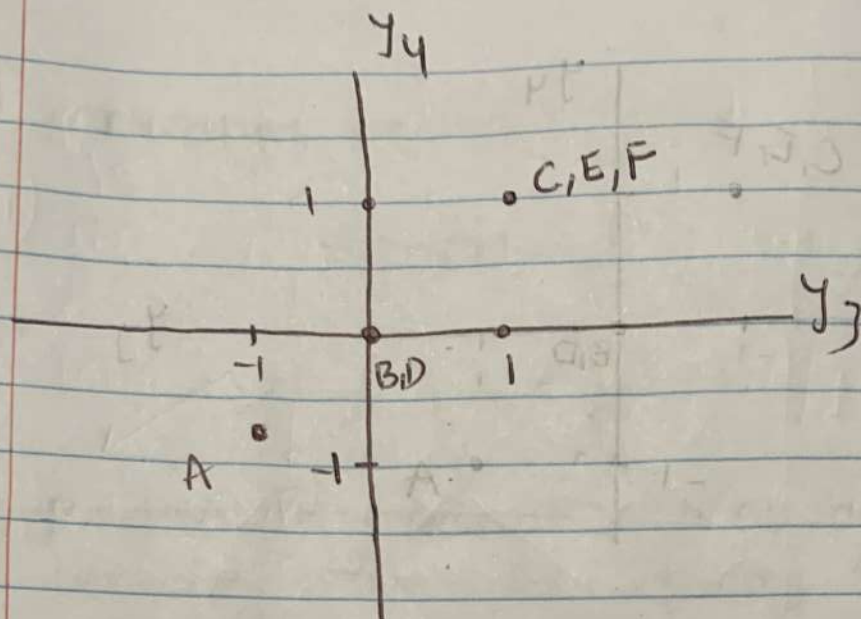




We cannot divide B, D and A, C, E, F

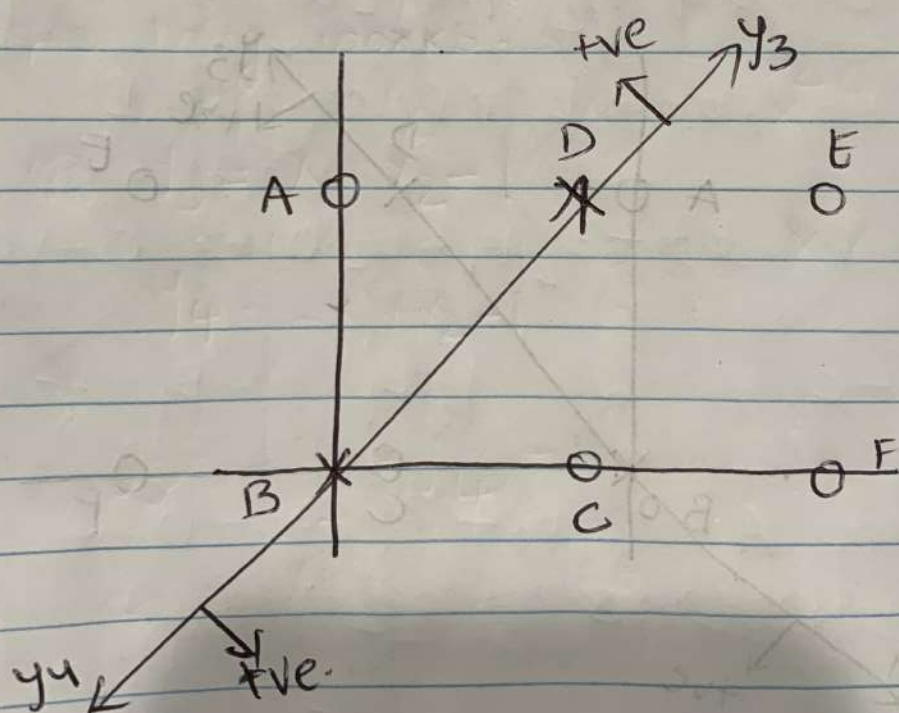
ii) consider the second scenario

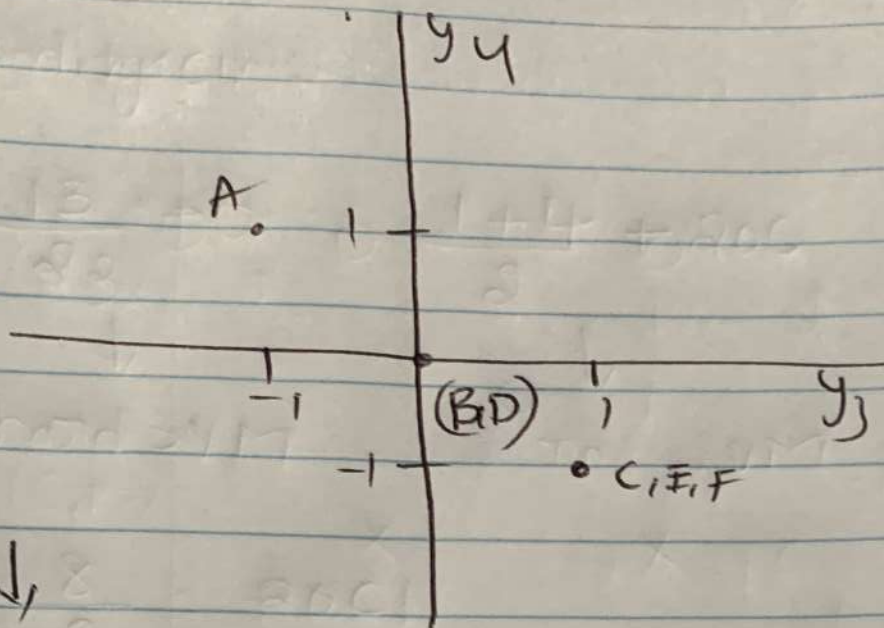




we cannot divide B, D and A, C, E, F

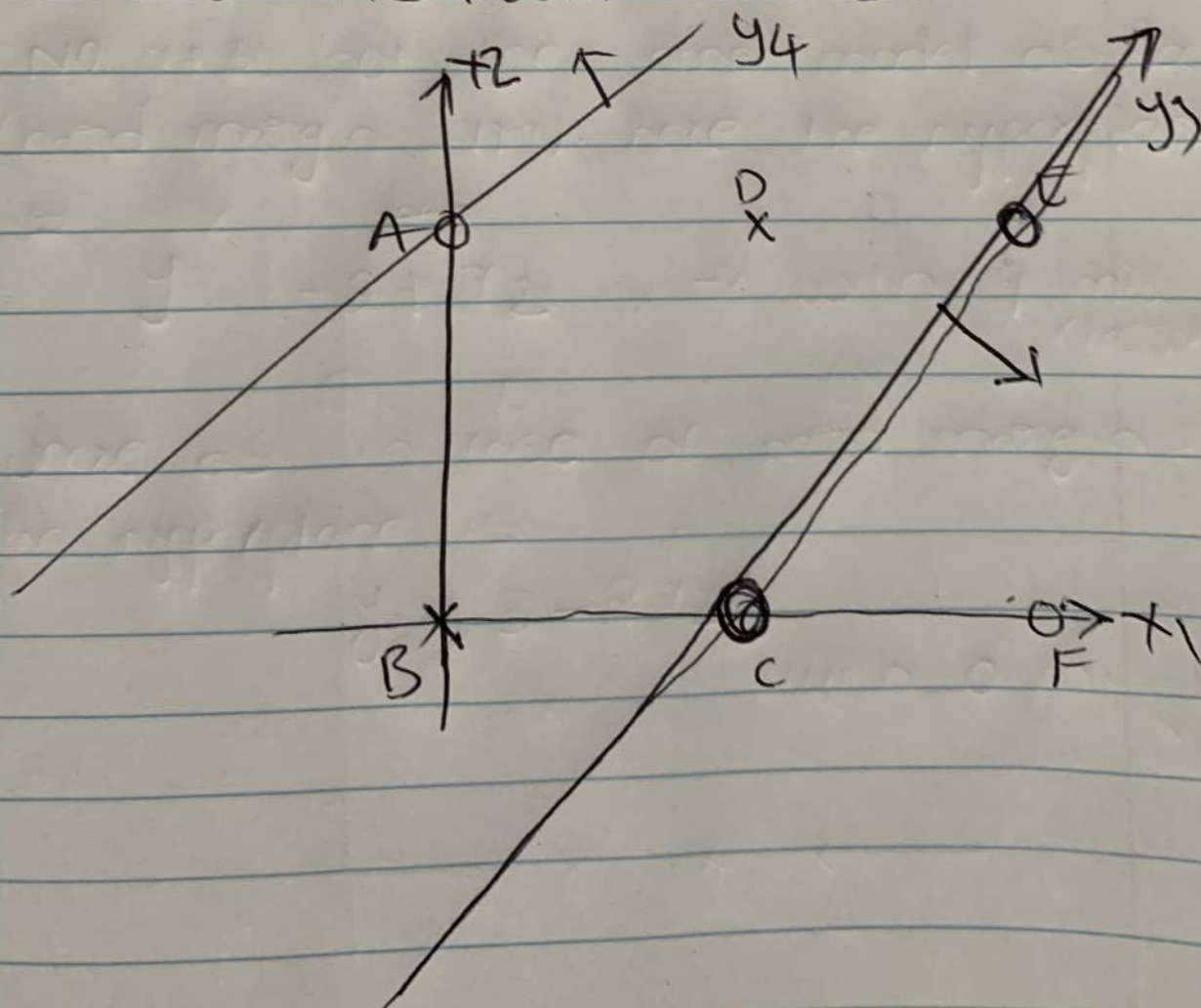
ii) consider third scenario



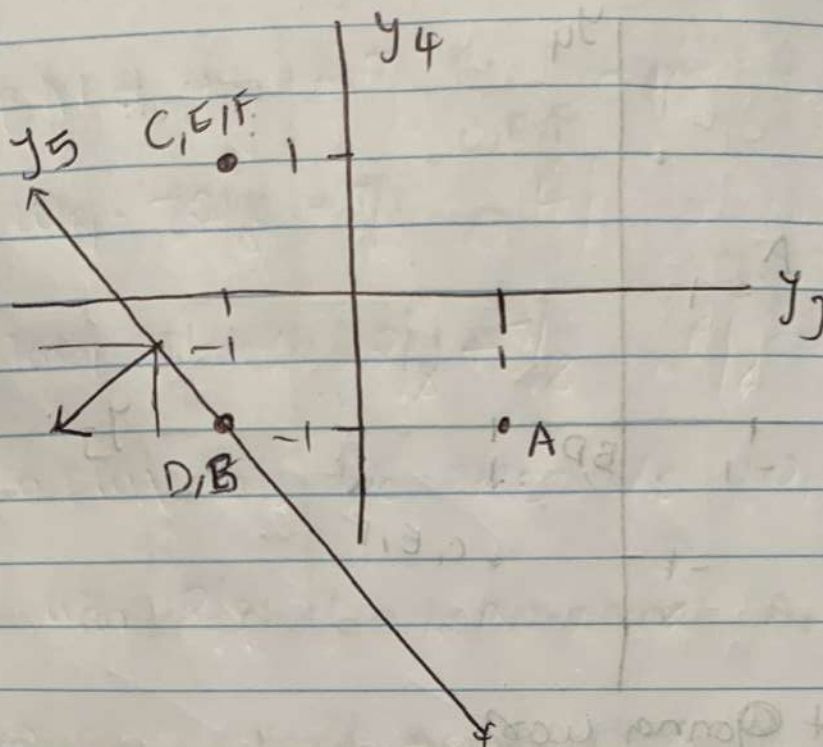


↓
Not gonna work

q)iv) considers this fourth scenario



c, d)



This thing works -

b) $y_3 = x_1 - x_2 - 1$

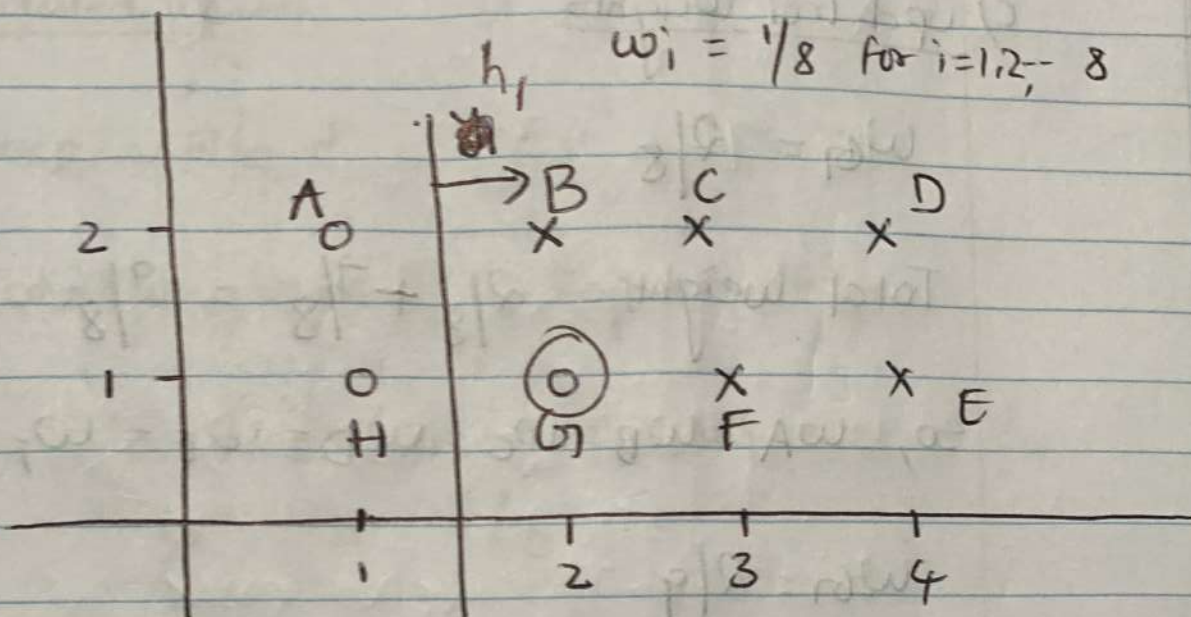
$y_4 = -x_1 + x_2 - 1$

e) $y_5 = -y_3 - y_4 - 1$

Let x - positive

4)

a)



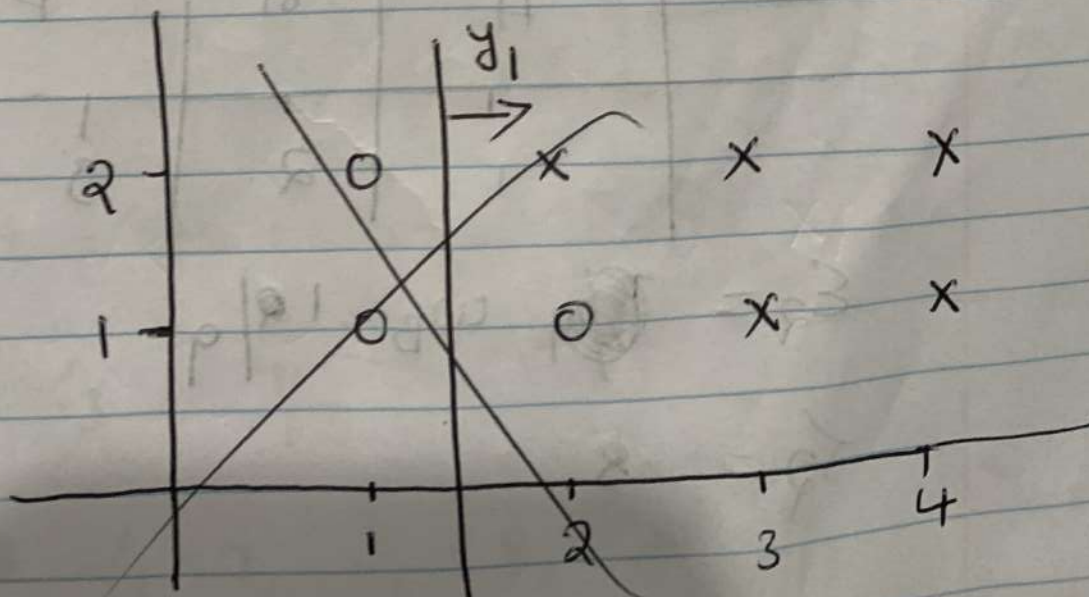
a)

$$e_{x_1} = 1/8 = e_1$$

b)

$$\lambda_1 = \frac{1 - 1/8}{1/8} = 7$$

c)



c) updated weights

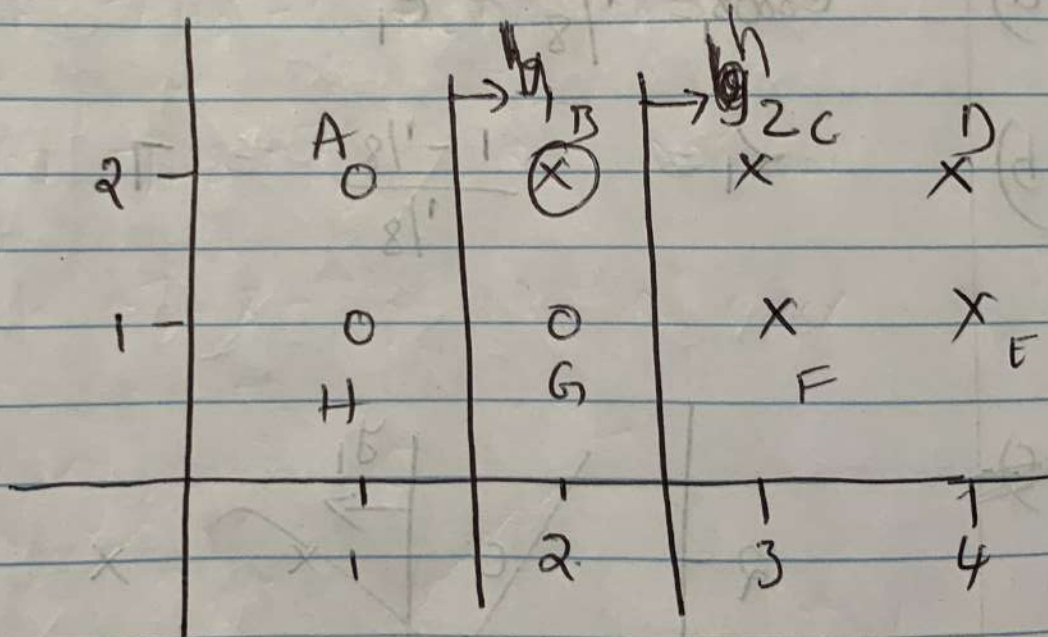
$$w_G = 2/8$$

$$\text{Total weight} = 2/8 + 7/8 = 9/8$$

$$\text{So, } w_A = w_B = w_C = w_D = w_E = w_F = w_H = 1/9$$

$$w_G = 2/9$$

So,



$$\Sigma_2 = 9 \quad w_B = 2/9$$

$$\Sigma_2 = 8$$

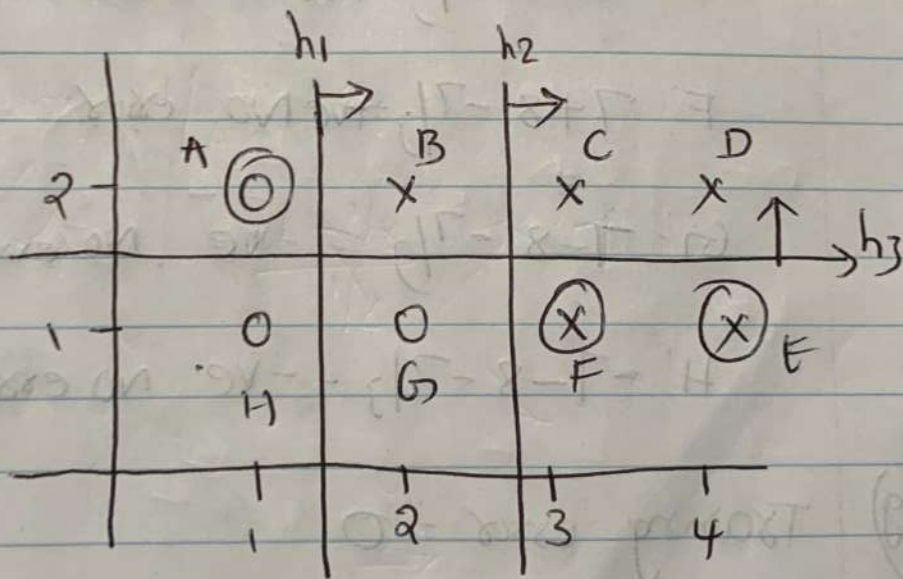
d) updated weights

$$w_B = 2/9$$

$$\text{Total weights} = 2/9 + 8/9 = 10/9$$

$$\text{So, } w_A = w_C = w_D = w_E = w_F = w_H = 1/10$$

$$w_G = w_B = 2/10$$



e) $\epsilon_3 = w_A + w_F + w_E = 3/10$

f) $\alpha_3 = 7/3$

g) $\alpha_1 = 7, \alpha_2 = 8, \alpha_3 = 7/3$

$$A: -7 - 8 + 7/3 = -ve \text{ NO error}$$

$$B: 7 - 8 + 7/3 = 4/3 = +ve \text{ NO error}$$

$$C: 7 + 8 + 7/3 = +ve \text{ NO error}$$

$$D: +ve \text{ NO error}$$

$$E: 7 + 8 - 7/3 = +ve \text{ NO error}$$

$$F: 7 + 8 - 7/3 = +ve \text{ NO error}$$

$$G: 7 - 8 - 7/3 = -ve \text{ NO error}$$

$$H: -7 - 8 - 7/3 = -ve \text{ NO error}$$

g) Training error = 0