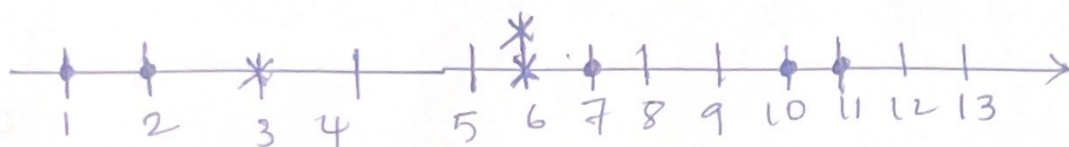## Question-10

Solution:-

Given data,

where we have 8 data points and 2 classes

let us consider two classes as Class A, Class B

Class A	Class B	
1	0	
2	0	
0	3	
0	0	Training
0	0	
0	6	
0	6	
7	0	
0	0	
0	0	Testing
10	0	
11	0	
0	0	
0	0	

We need calculate the distance from each testing data set to training data set

Equilidean distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(10)

I)

1) $\sqrt{(7-1)^2 + (0)^2}$
$= \sqrt{(6)^2} = 6$

2) $\sqrt{(0-1)^2 + (0)^2}$
$= \sqrt{(1)^2} = 1$

3) $\sqrt{(0-1)^2 + (0)^2}$
$= 1$

4) $\sqrt{(10-1)^2 + (0)^2}$
$= \sqrt{(9)^2} = 9$ //

5) $\sqrt{(11-1)^2 + (0)^2} = 10$

6) $\sqrt{(0-1)^2 + (0)^2} = \sqrt{(1)^2} = 1$

7) $\sqrt{(0-1)^2 + (0)^2} = \sqrt{(1)^2} = 1$

We got the following
64
distances between class A
data points = $[6, 1, 1, 9, 10, 1, 1]$

II)

1) $\sqrt{(7-2)^2 + (0)^2}$
$= 5$

2) $\sqrt{(0-2)^2 + (0)^2} = 2$

4) $\sqrt{(10-7)^2 + (0)^2} = 8$

5) $\sqrt{(0-2)^2 + (0)^2} = 2$

5) $\sqrt{(11-2)^2 + (0)^2} = 9$

6) $\sqrt{(0-2)^2 + (0)^2} = 2$

7) $\sqrt{(0-2)^2 + (0)^2} = 2$

II $[5, 2, 8, 2, 9, 2, 2]$

III)

1) $\sqrt{(7-0)^2 + (0)^2} = 7$

2) $\sqrt{(0-0)^2 + (0)^2} = 0$

3) 0

4) $\sqrt{(10-0)^2 + (0)^2} = 10$

5) $\sqrt{(11-0)^2 + (0)^2} = 11$

6) 6

7) 6

Total distances = $[7, 0, 0, 11, 6, 6]$

IV) ① 7
② $\sqrt{(0-0)^2 + (0-3)^2}$
$= \sqrt{(+3)^2}$
$= 3$

③) 7 + 3

④ $\sqrt{(10)^2 + (3)^2}$
$= \sqrt{100+9}$
$= \sqrt{109} = 10.44$

⑤

$$\sqrt{11^\vee - (3)^\vee}$$

$$= \sqrt{121 + 9}$$

$$= \sqrt{130}$$

$$= 11.40$$

⑥ −3

⑦ −3

7, +3, +3, 10.44, 11.40, +3, +3

① − 7

② 0

③ 0

④ 10

⑤ 11

⑥ 6

⑦ 6

7, 0, 0, 10, 11, 6, 6

7, 0, 0, 10, 11, 6, 6

① $\sqrt{7^\vee + 6^\vee}$

$$= \sqrt{49 + 36}$$

$$= 9.21$$

② 6

③ 6

④ $\sqrt{10^\vee + 6^\vee}$

$$= \sqrt{136}$$

$$= 11.66$$

⑤ $\sqrt{11^\vee + 6^\vee}$

$$= \sqrt{157}$$

$$= 12.52$$

9.21, 6, 6, 11.66, 12.52, 6, 6

⑥ 6 , ⑦ 6

2 classes

8 - data points

feature

f	Yes	NO
1	1	
2	2	
3		3
4		
5		
6		6,6
7	7	
8		
9		
10	10	
11	11	
12		
13		

training

testing

$$Precision = \frac{T_P}{(T_P + f_P)}$$

$$Precision = \frac{2}{2+1}$$

$$= \frac{2}{3}$$

$$\boxed{Precision = 0.66}$$

$$Specificity = \frac{TN}{TN + f_P}$$

$$= \frac{2}{2+3}$$

$$= \frac{2}{5}$$

$$\boxed{Specificity = 0.4}$$

actual

c_1 - Yes	1, 2 TP	7, 10, 11 fN
c_2 - NO	3 fp	6, 6 TN

3

$$accuracy = \frac{T_P + TN}{a_u}$$

$$accuracy = \frac{2+2}{8} = \frac{1}{2} = 0.5$$

acc