Exercise 1

Consider the following points:

Pt.	X	Y
P1	2	3
P2	3	1
P3	4	2
P4	11	5
P5	12	4
P6	12	6
P7	7	5
P8	8	4
P9	8	6

a) Apply K-means starting from the centroids: K1=P2 and K2 = P8

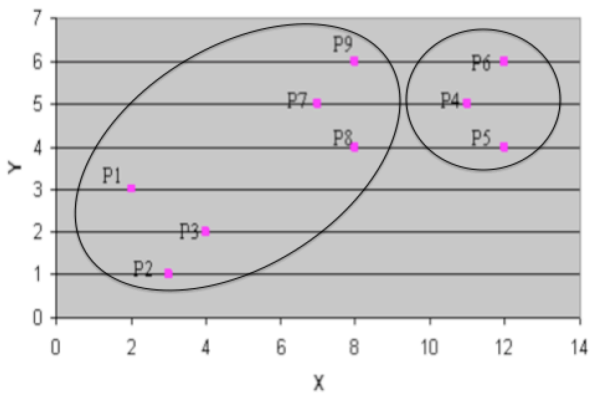b) Select a pair of initial centroids such that we get two different clusters

Solution

a)
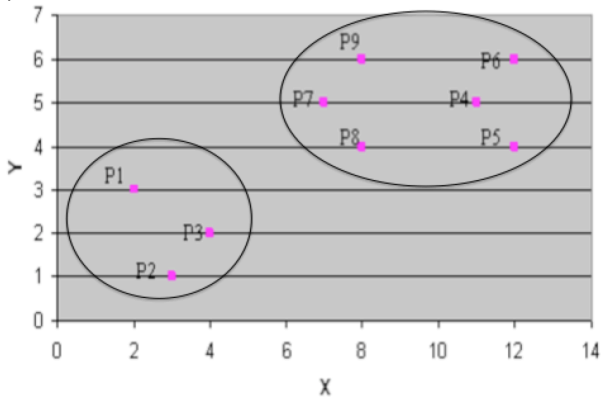
b)

Selecting K1=P7 e K2=P4 we get the following clusters

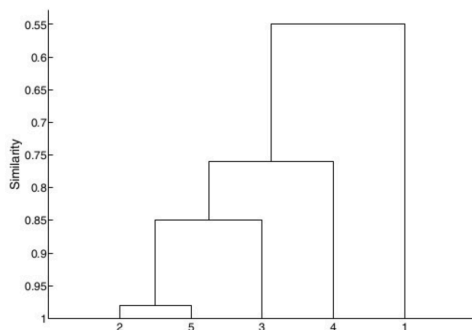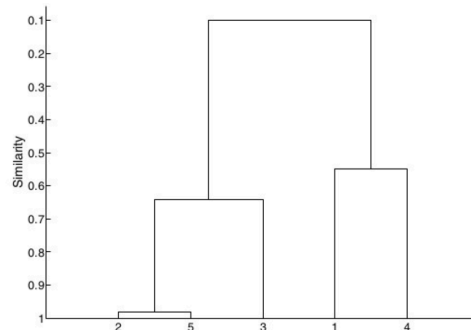**Exercise 2**

Execute single-linkage and complete-linkage HAC on the following similarity matrix, and draw the corresponding dendograms:

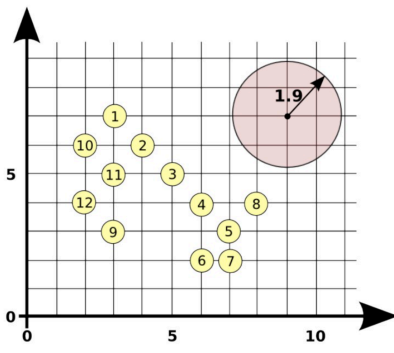|	p1	p2	p3	p4	p5
p1	1.00	0.10	0.41	0.55	0.35
p2	0.10	1.00	0.64	0.47	0.98
p3	0.41	0.64	1.00	0.44	0.85
p4	0.55	0.47	0.44	1.00	0.76
p5	0.35	0.98	0.85	0.76	1.00

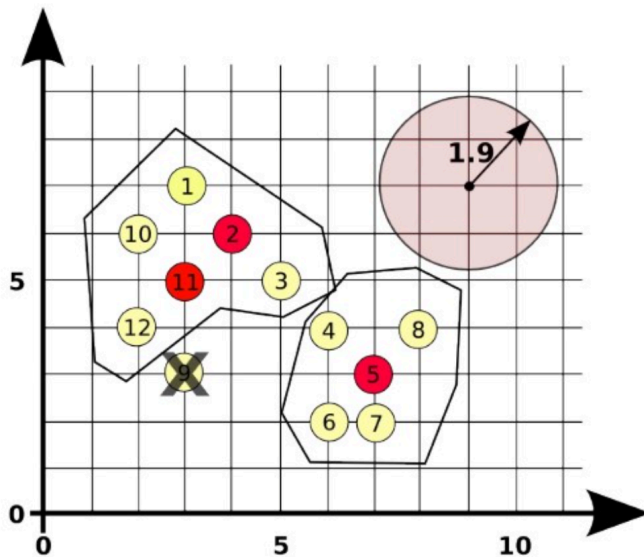**Solution**

(a) Single link.

(b) Complete link.

Exercise 3

Apply DBSCAN Algorithm with radius 1.9 and MinPts=4 (3 neighbors + the point we are considering as center for computing the density).

1) Indicate if a point is a *core, border* or *noise* point.
2) Indicate the clusters obtained

Solution

Red points are *cores*, yellow points are *borders*. *Noise points* are eliminated.

Exercise 4

Apply DBSCAN Algorithm with radius 1.9 and MinPts=4 (3 neighbors + the point we are considering as center for computing the density).

1) Indicate if a point is a *core, border* or *noise* point.
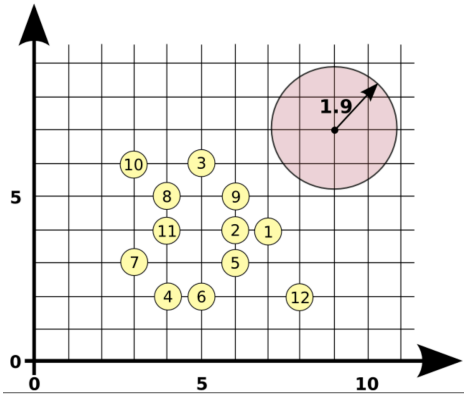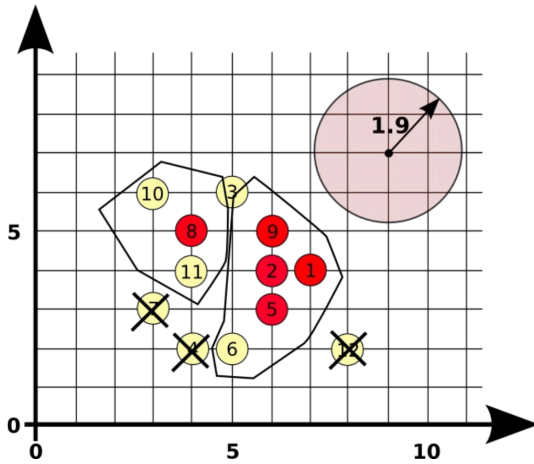2) Indicate the clusters obtained

Solution

Red points are *cores*, yellow points are *borders*. *Noise points* are eliminated.