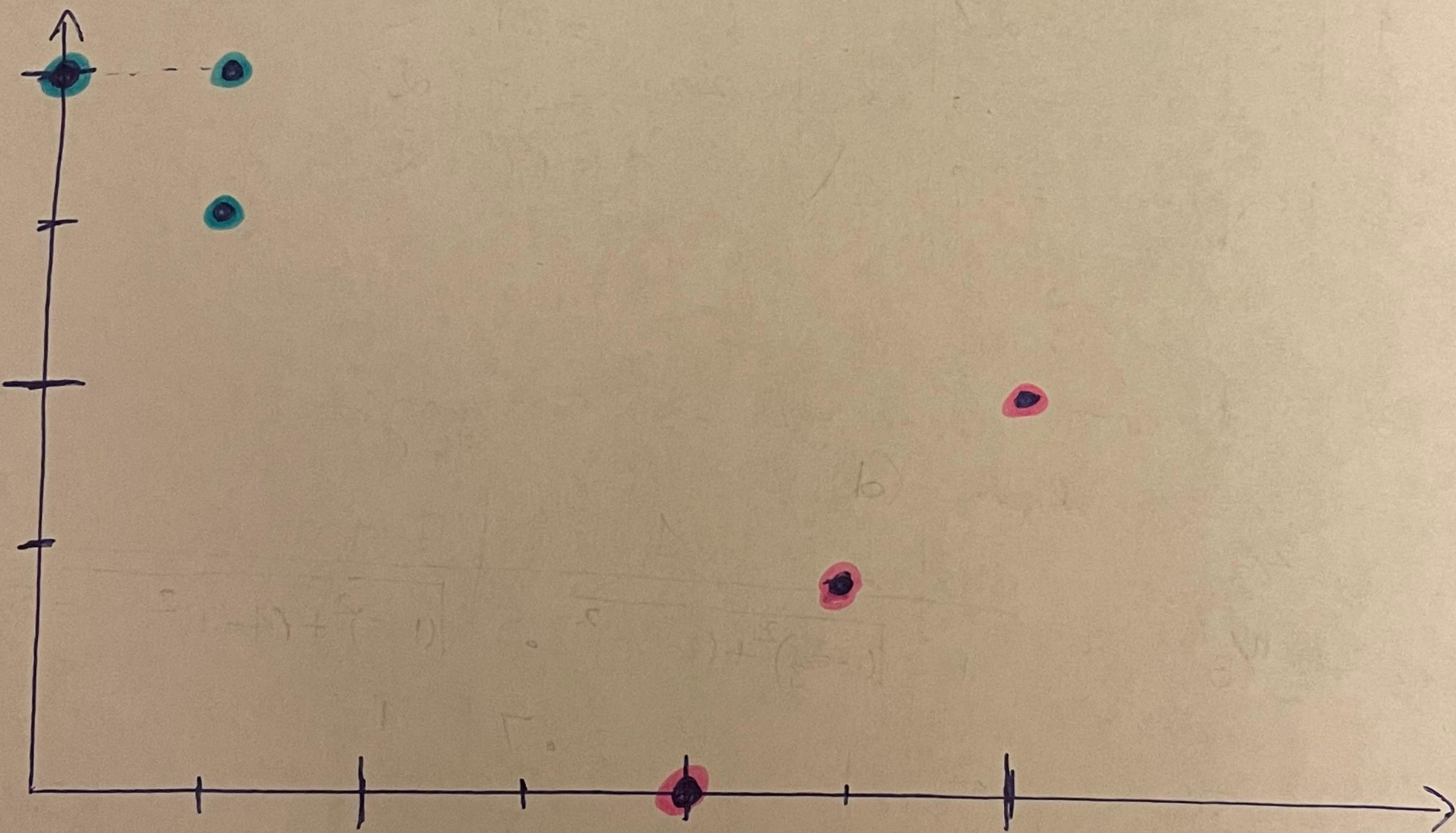


3.)

Obs	$X_1$	$X_2$
1	1	4
2	1	3
3	0	4
4	5	1
5	6	2
6	4	0

(a.) Plot the obs:



(b) Randomly assign a cluster label to each obs.  
using `set.seed(1)` and `sample(c(1,2), 6, replace=TRUE)`, I obtain:

Obs	Clust
1	1
2	2
3	1
4	1
5	2
6	1

(c) Compute Centroid for each cluster:

Cluster 1

$$\bar{x}_1 = (\frac{1}{4})(1+0+5+4) = 2.5$$

$$\bar{x}_2 = (\frac{1}{4})(4+4+1+0) = 2.25$$

$$(2.5, 2.25) = (\bar{x}_1, \bar{x}_2)$$

Cluster 2

$$\bar{x}_1 = (\frac{1}{2})(1+6) = 3.5$$

$$\bar{x}_2 = (\frac{1}{2})(3+2) = 2.5$$

$$(3.5, 2.5) = (\bar{x}_1, \bar{x}_2)$$

(d) Assignment

Obs	Dist to 1	Dist to 2	New Assignment
1	$\sqrt{(1-2.5)^2 + (4-2.25)^2} = 2.3$	$\sqrt{(1-3.5)^2 + (4-2.5)^2} = 2.9$	1
2	1	3 = 1.7	1
3	0	4 = 3.1	1
4	5	1 = 2.8	2
5	6	2 = 3.5	2
6	4	0 = 2.7	2

(e) Repeat (c) and (d) until the answers stop changing:

Repeat (c)

$$\bar{x}_{1,1} = (\frac{1}{3})(1+1+0) = 2/3$$

$$\bar{x}_{1,2} = (\frac{1}{3})(4+3+4) = 11/3$$

$$\bar{x}_{2,1} = (\frac{1}{3})(5+6+4) = 5$$

$$\bar{x}_{2,2} = (\frac{1}{3})(1+2+0) = 1$$

Repeat (d)

Obs	Dist to 1	Dist to 2	New Assignment
1	$\sqrt{(\frac{1}{3}-2)^2 + (4-\frac{11}{3})^2} = .5$	$\sqrt{(\frac{1}{3}-5)^2 + (4-1)^2} = 5$	1
2	1	3 = .7	1
3	0	4 = .7	2
4	5	1 = 5.1	2
5	6	2 = 5.6	2
6	4	0 = 5.0	2

Answers have stopped changing!

(f) In my plot from (a), I will color:

(i) Cluster 1 obs = Blue ●

(ii) Cluster 2 obs = Pink ●