CMPE-256- Assignment-6
Starbucks Hot Beverages cluster.

Part A: To approach this problem, we will be using K-means clustering with K=3 which will help us obtain 3 clusters which will give us three busiest/popular times of the days. This will help ~~us~~ store manager provide coupons to the customers to maximize customer loyalty.

~~Lets take~~ f Lets choose (1,7), (8,1) and (6,9) as our initial clusters as they are the farthest points.

~~Subject A B~~

Subject	PT Index	HB Index.
1	1	5
2	1	7
3	2	6
4	2	9
5	3	3
6	3	6
7	3	8
8	3	4
9	4	5
10	4	8
11	5	4
12	5	9
13	6	9
14	7	2
15	7	3
16	7	9
17	8	1
18	8	7.

Lets choose our initial clusters as (1,7), (8,1) and (6,9). as they are farthest points.

	Individual	Centroid
clusters 1	2	(1,7)
Cluster 2	13	(6,9)
Cluster 3	17	(8,1)

	Cluster 1		Cluster 2		Cluster 3	
Step	Individual	Centroid	Individual	Centroid	Individual	Centroid
1	2	(1,7)	13	(6,9)	17	(8,1)
2	1,2	(1,6)	13	(6,9)	17	(8,1)
3	1,2,3	(1.3,6)	13	(6,9)	17	(8,1)
4	1,2,3,4	(2.75,6.75)	13	(6,9)	17	(8,1)
5	1,2,3,4,5	(2.8,6)	13	(6,9)	17	(8,1)
6	1,2,3,4,5,6	(2.83,6)	13	(6.6,9)	17	(8,1)
7	1,2,3,4,5,6,7	(2.85,6.28)	13	(6,9)	17	(8,1)
8	1,2,3,4,5,6, 7,8	(2.87,6.62)	13	(6,9)	17	(8,1)
9	1,2,3,4,5,6, 7,8,9	(3,6.44)	13	(6,9)	17	(8,1)
10	1,2,3,4,5,6 7,8,9,10	(3.1,6.6)	13	(6,9)	17	(8,1)

11	1,2,3,4,5,6, 7,8,9,10,11	(3.27,6.36)	13	(6,9)	17	(8,1)
12	1,2,3,4,5,6,7, 8,9,10,11,12	(3.41,6.41)				
13	1,2,3,4,5,6,7, 8,9,10,11,12	(3.41,6.41)	13	(6,9)	~~17~~ 17,14	(7.5,1.5)
14	1,2,3,4,5,6,7, 8,9,10,11,12	(3.41,6.41)	13	(6,9)	~~15~~ 14,15, 17	(7.33,2)
15	1,2,3,4,5,6,7, 8,9,10,11,12	(3.41,6.41)	13,16	(6.5,9)	14,15,~~17~~	(7.33,2)
16	1,2,3,4,5,6,7 8,9,10,11,12	(3.41,6.41)	13,16,18	(7, 8.3)	14,15,17	(7.33,2)

So, ~~we~~ lets compare each individual's distance to its own cluster ~~an~~ mean and ~~to~~ that of ~~opposite~~ other clusters.

Individual	Distance of centroid of Cluster 1 (3·41, 6·41)	Distance to centroid of cluster 2 (7·83)	Distance to centroid of Cluster 3 (7·33, 2)
1	2·79	6·85	7
2	2·48	6·14	8·07
3	1·47	5·5	6·66
4	2·95	5·05	8·80
5	3·43	6·64	4·44
6	0·58	4·61	5·89
7	1·64	4·01	7·40
8	2·62	4·06	8·23
9	1·53	4·46	4·48
10	1·7	3·01	6·86
11	2·8	4·74	3·07
12	1·7	2·39	5·52
13	3·66	1·22	7·13
14	5·69	6·3	0·33
15	4·95	5·3	1·05
16	4·43	0·7	7·01
17	7·09	7·37	1·20
18	4·63	1·64	5·04

Since, ~~all~~ we verified that all the points are in ~~one~~ correct cluster. Therefore, Our ferial three cluster are

	Individual	Centroid.
Cluster 1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	3.41, 6.41
Cluster 2	13, 16, 18	7, 8.3
Cluster 3	14, 15, 17	7.33, 2

The busiet time which we observed are

PT Index → 4, 7, 8

and Popular times → 9am – 10am
1pm – 3pm
3pm – 4pm.