CS 260 - A6
Marissa Norris

1st	Cluster 1: O8(14,5)	Cluster 2: O3(20,8)	Cluster 3: O12(26, 3)	
	Euclidian Distance (√) to Cluster 1	Euclidian Distance (√) to Cluster 2	Euclidian Distance (√) to Cluster 3	Closest Center
O1 (2,2)	√[(2-14)^2] + [(2-5)^2] = √153 = 12.3	√360 = 18.9	√577 = 24.0	C1
02 (27,2)	√178 = 13.3	√85 = 9.2	√2 = 1.4	C3
O3 (20,8)	√45 = 6.7	√0 = 0	√61 = 7.81	C2
O4 (25,1)	√137 = 11.7	√74 = 8.6	√5 = 2.2	C3
O5 (12,4)	√5 = 2.2	√80 = 8.9	√197 = 14.0	C1
O6 (21,6)	√50 = 7.0	√5 = 2.2	√34 = 5.8	C2
O7 (18,6)	√17 = 4.1	√8 = 2.8	√73 = 8.5	C2
O8 (14,5)	√0 = 0	√45 = 6.7	√148 = 12.2	C1
O9 (16,5)	√4 = 2	√25 = 5	√104 = 10.2	C1
O10 (24,4)	√101 = 10.0	√32 = 5.7	√5 = 2.2	C3
O11 (21,4)	√50 = 7.1	√17 = 4.1	√26 = 5.1	C2
O12 (26,3)	√148 = 12.8	√61 = 7.8	√0 = 0	C3

Different clusters from after Iteration 1

- ★ CLUSTER 1 = {O1, O5, O8, O9}
- ★ CLUSTER 2 = {O3, O6, O7, O11}
- ★ CLUSTER 3 = {O2, O4, O10, O12}

New center points

- ★ CLUSTER 1
  (2+12+14+16)/4 = 11
  (2+4+5+5)/4 = 4
- ★ CLUSTER 2
  (20+21+18+21)/4 = 20
  (8+6+6+4)/4 = 6
- ★ CLUSTER 3
  (27+25+24+26)/4 = 25.5
  (2+1+4+3)/4 = 2.5

2nd	Cluster 1: (11, 4)	Cluster 2: (20, 6)	Cluster 3: (25.5, 2.5)		
	Euclidian Distance (√) to Cluster 1	Euclidian Distance (√) to Cluster 2	Euclidian Distance (√) to Cluster 3	1st Closest Center	2nd Closest Center
O1 (2,2)	√[(2-11)^2] + [(2-4)^2] = √85 = 9.2	√340 = 18.4	√552.5 = 23.5	C1	C1
02 (27,2)	√260 = 16.1	√65 = 8.1	√2.5 = 1.6	C3	C3
O3 (20,8)	√97 = 9.8	√4 = 2	√60.5 = 7.8	C2	C2
O4 (25,1)	√205 = 14.3	√50 = 7.1	√2.5 = 1.6	C3	C3
O5 (12,4)	√1 = 1	√68 = 8.21	√184.5 = 13.6	C1	C1
O6 (21,6)	√104 = 10.2	√1 = 1	√32.5 = 5.7	C2	C2
O7 (18,6)	√53 = 7.3	√4 = 2	√68.5 = 8.3	C2	C2
O8 (14,5)	√10 = 3.2	√37 = 6.1	√138.5 = 11.8	C1	C1
O9 (16,5)	√26 = 5.1	√17 = 4.1	√96.5 = 9.8	C1	C2
O10 (24,4)	√169 = 13	√20 = 4.5	√4.5 = 2.1	C3	C3
O11 (21,4)	√100 = 10	√5 = 2.2	√22.5 = 4.7	C2	C2
O12 (26,3)	√226 = 15	√45 = 6.7	√0.5 = 0.7	C3	C3

Different clusters from after Iteration 2

- ★ CLUSTER 1 = {O1, O5, O8}
- ★ CLUSTER 2 = {O3, O6, O7, O9, O11}
- ★ CLUSTER 3 = {O2, O4, O10, O12}

New center points

- ★ CLUSTER 1
  - (2+12+14)/3 = 9.3
  - (2+4+5)/3 = 3.7
- ★ CLUSTER 2
  - (20+21+18+16+21)/5 = 19.2
  - (8+6+6+5+4)/5 = 5.8
- ★ CLUSTER 3
  - (27+25+24+26)/4 = 25.5
  - (2+1+4+3)/4 = 2.5

3rd	Cluster 1: (9.3, 3.7)	Cluster 2: (19.2, 5.8)	Cluster 3: (25.5, 2.5)			
	Euclidian Distance (√) to Cluster 1	Euclidian Distance (√) to Cluster 2	Euclidian Distance (√) to Cluster 3	1st Closest Center	2nd Closest Center	3rd Closest Center
O1 (2,2)	√[(2-9.3)^2] + [(2-3.7)^2] = √56.2 = 7.5	√310.3 = 17.6	√552.5 = 23.5	C1	C1	C1
02 (27,2)	√316.2 = 17.8	√75.3 = 8.7	√2.5 = 1.6	C3	C3	C3
O3 (20,8)	√132.9 = 11.5	√5.5 = 2.3	√60.5 = 7.8	C2	C2	C2
O4 (25,1)	√253.8 = 15.9	√56.7 = 7.5	√2.5 = 1.6	C3	C3	C3
O5 (12,4)	√7.4 = 2.7	√55.1 = 7.4	√184.5 = 13.6	C1	C1	C1
O6 (21,6)	√142.2 = 11.9	√3.3 = 1.8	√32.5 = 5.7	C2	C2	C2
O7 (18,6)	√80.9 = 8.9	√1.5 = 1.2	√68.5 = 8.3	C2	C2	C2
O8 (14,5)	√23.8 = 4.9	√27.7 = 5.3	√138.5 = 11.8	C1	C1	C1
O9 (16,5)	√46.6 = 6.8	√10.9 = 3.3	√96.5 = 9.8	C1	C2	C2
O10 (24,4)	√216.2 = 14.7	√26.3 = 5.1	√4.5 = 2.1	C3	C3	C3
O11 (21,4)	√136.9 = 11.7	√6.5 = 2.5	√22.5 = 4.7	C2	C2	C2
O12 (26,3)	√279.4 = 16.7	√54.1 = 7.4	√0.5 = 0.7	C3	C3	C3

Different clusters from after Iteration 3

- ★ CLUSTER 1 = {O1, O5, O8}
- ★ CLUSTER 2 = {O3, O6, O7, O9, O11}
- ★ CLUSTER 3 = {O2, O4, O10, O12}

NO CHANGE

K-means: assign points to nearest center

Final Result	Cluster 1	Cluster 2	Cluster 3
Centers	(9.3, 3.7)	(19.2, 5.8)	(25.5, 2.5)
Data	{O1, O5, O8}	{O3, O6, O7, O9, O11}	{O2, O4, O10, O12}