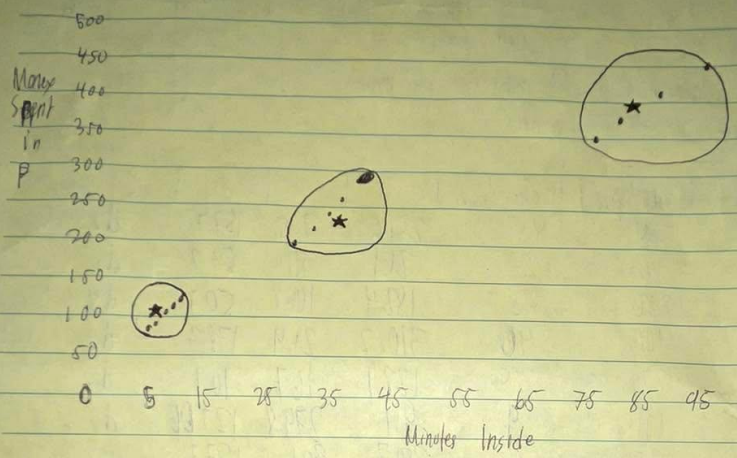
COM-232
Franc Thomas A. Sio

NO.:
DATE: 11/20/25

1. Plot the data in a scatter plot (10pts)



2. Using the randomly selected initial clusters, calculate the distances of all data points using Euclidian distance

3. Assign each data point to a cluster

	Customer	Money Spent	Minutes Inside	d_1	d_2	d_3	Cluster
	380	85	310.5	30.4	188.2	d_2
/	80	5	0	280.2	122.6	d_1
	280	45	204	78.3	81.4	d_2
	400	90	331.1	51	208.8	d_2
	220	35	143.2	137.6	20.6	d_3
	110	9	30.3	250.3	92.4	d_1
/	380	80	280.2	80.3	158.1	d_2
	450	100	382	102	259.6	d_2
	100	8	20.2	260.2	102.4	d_1
	240	38	163.4	117.7	40.8	d_3
	120	10	40.3	240.4	82.46	d_1
	260	42	188.8	97.7	61.2	d_3
	95	7	15.1	265.2	107.5	d_1
/	200	30	122.6	155.1	0	d_3
	420	95	351.7	216	229.4	d_2

4. Calculate the mean of the clusters

NO:
DATE:

New Centroid of d_1 Cluster:
$a_1 = \frac{80+110+100+85+85}{5} = 101$
$b_1 = \frac{5+9+8+10+7}{5} = 7.8$
$= 101, 7.8$

New Centroid of d_2 Cluster:
$a_2 = \frac{380+280+400+350+450+420}{6} = 380$
$b_2 = \frac{85+45+90+80+100+95}{6} = 82.5$
$= 380, 82.5$

New Centroid of d_3 Cluster
$a_3 = \frac{220+240+260+200}{4} = 230$
$b_2 = \frac{35+38+42+30}{4} = 36.25$
$= 230, 36.25$

5. Recalculate the distance of all data points from the mean
6. Assign a cluster for all data points

Customer Name	Money Spent	Minutes Inside	d_1	d_2	d_3	Cluster
	380	85	289.6	7.5	157.7	d_2
	80	5	21.1	310	53.2	d_1
	280	45	182.9	106.8	50.7	d_3
	400	90	310.2	21.4	178.3	d_2
	220	35	122.1	167	10.1	d_3
	110	9	9.1	279.8	123.06	d_1
	350	80	259.3	30.1	127.7	d_2
	450	100	361.1	72.2	229.1	d_2
	100	8	1.1	289.7	133	d_1
	240	38	142.3	146.9	10.1	d_3
	120	10	37.6	269.9	113.1	d_1
	260	42	162.7	126.7	30.5	d_3
	95	7	6	294.8	138.1	d_1
	200	30	101.5	187.5	30.7	d_3
	420	95	330.8	41.9	198.9	d_2

7 Plot the Final cluster in a scatter plot

→(more to step 1)

Frane Thomas A. Sia Solution

NO.:
DATE:

d1

$d=\sqrt{(180-350)^2+(5-85)^2}$
$d=\sqrt{96400}$
$d=310.5$

$d=\sqrt{(180-80)^2+(5-5)^2}$
$d=\sqrt{0}$
$d=0$

$d=\sqrt{(180-240)^2+(5-45)^2}$
$d=\sqrt{41600}$
$d=204$

$d=\sqrt{(180-400)^2+(5-90)^2}$
$d=\sqrt{109625}$
$d=331.1$

$d=\sqrt{(180-220)^2+(5-35)^2}$
$d=\sqrt{20500}$
$d=143.2$

$d=\sqrt{(180-110)^2+(5-9)^2}$
$d=\sqrt{916}$
$d=30.3$

$d=\sqrt{(180-350)^2+(5-80)^2}$
$d=\sqrt{78525}$
$d=280.2$

$d=\sqrt{(180-450)^2+(5-100)^2}$
$d=\sqrt{145925}$
$d=382$

$d=\sqrt{(180-100)^2+(5-8)^2}$
$d=\sqrt{409}$
$d=20.2$

$d=\sqrt{(180-240)^2+(5-38)^2}$
$d=\sqrt{26689}$
$d=163.4$

$d=\sqrt{(180-120)^2+(5-10)^2}$
$d=\sqrt{1625}$
$d=40.3$

$d=\sqrt{(180-95)^2+(5-7)^2}$
$d=\sqrt{229}$
$d=15.1$

$d=\sqrt{(180-260)^2+(5-42)^2}$
$d=\sqrt{33769}$
$d=83.8$

$d=\sqrt{(180-200)^2+(5-30)^2}$
$d=\sqrt{15025}$
$d=122.6$

$d=\sqrt{(180-420)^2+(5-95)^2}$
$d=\sqrt{123700}$
$d=351.7$

d3

$d=\sqrt{(200-350)^2+(30-85)^2}$
$d=\sqrt{35425}$
$d=188.2$

$d=\sqrt{(200-80)^2+(30-5)^2}$
$d=\sqrt{15025}$
$d=122.6$

$d=\sqrt{(200-240)^2+(30-45)^2}$
$d=\sqrt{1625}$
$d=81.4$

$d=\sqrt{(200-400)^2+(30-90)^2}$
$d=\sqrt{43600}$
$d=208.8$

$d=\sqrt{(200-220)^2+(30-35)^2}$
$d=\sqrt{425}$
$d=20.6$

$d=\sqrt{(200-110)^2+(30-9)^2}$
$d=\sqrt{8541}$
$d=92.4$

$d=\sqrt{(200-350)^2+(30-80)^2}$
$d=\sqrt{25000}$
$d=158.1$

$d=\sqrt{(200-450)^2+(30-100)^2}$
$d=\sqrt{67400}$
$d=259.6$

$d=\sqrt{(200-100)^2+(30-8)^2}$
$d=\sqrt{10484}$
$d=102.4$

$d=\sqrt{(200-240)^2+(30-38)^2}$
$d=\sqrt{1664}$
$d=40.8$

$d=\sqrt{(200-170)^2+(30-10)^2}$
$d=\sqrt{6800}$
$d=82.46$

$d=\sqrt{(200-260)^2+(30-42)^2}$
$d=\sqrt{3744}$
$d=61.2$

$d=\sqrt{(200-95)^2+(30-7)^2}$
$d=\sqrt{11554}$
$d=107.5$

$d=\sqrt{(200-200)^2+(30-30)^2}$
$d=\sqrt{0}$
$d=0$

$d=\sqrt{(200-420)^2+(30-95)^2}$
$d=\sqrt{52625}$
$d=229.4$

NO.:
DATE:

d2

$d=\sqrt{(350-350)^2+(80-85)^2}$

$d=\sqrt{925}$

$d=30.4$

$d=\sqrt{(350-80)^2+(80-5)^2}$

$d=\sqrt{78575}$

$d=280.2$

$d=\sqrt{(350-250)^2+(80-45)^2}$

$d=\sqrt{6125}$

$d=78.3$

$d=\sqrt{(350-400)^2+(80-40)^2}$

$d=\sqrt{2600}$

$d=51$

$d=\sqrt{(350-200)^2+(80-35)^2}$

$d=\sqrt{18925}$

$d=137.6$

$d=\sqrt{(350-100)^2+(80-49)^2}$

$d=\sqrt{62641}$

$d=250.3$

$d=\sqrt{(350-450)^2+(80-100)^2}$

$d=\sqrt{10400}$

$d=102$

$d=\sqrt{(350-100)^2+(80-85)^2}$

$d=\sqrt{62684}$

$d=260.2$

$d=\sqrt{(350-240)^2+(80-38)^2}$

$d=\sqrt{13864}$

$d=117.7$

$d=\sqrt{(350-170)^2+(80-40)^2}$

$d=\sqrt{57800}$

$d=240.4$

$d=\sqrt{(380-260)^2+(80-42)^2}$

$d=\sqrt{9544}$

$d=97.7$

$d=\sqrt{(350-45)^2+(80-7)^2}$

$d=\sqrt{70354}$

$d=265.2$

$d=\sqrt{(350-200)^2+(80-30)^2}$

$d=\sqrt{25000}$

$d=158.1$

$d=\sqrt{(350-400)^2+(80-95)^2}$

$d=\sqrt{5125}$

$d=71.6$

Erwin Thomas A. Sio

Solution Part 2.

NO.:
DATE:

d1

$d=\sqrt{(101-380)^2+(7.8-85)^2}$
$d=\sqrt{43847.3}$
$d=209.6$

$d=\sqrt{(101-400)^2+(7.8-90)^2}$
$d=\sqrt{96207.3}$
$d=310.2$

$d=\sqrt{(101-350)^2+(7.8-80)^2}$
$d=\sqrt{67257.3}$
$d=259.3$

$d=\sqrt{(101-240)^2+(7.8-38)^2}$
$d=\sqrt{20251.3}$
$d=142.3$

$d=\sqrt{(101-95)^2+(7.8-7)^2}$
$d=\sqrt{36.3}$
$d=6.$

$d=\sqrt{(101-80)^2+(7.8-5)}$
$d=\sqrt{447.3}$
$d=21.1$

$d=\sqrt{(101-220)^2+(7.8-35)^2}$
$d=\sqrt{14917.3}$
$d=122.1$

$d=\sqrt{(101-450)^2+(7.8-100)^2}$
$d=\sqrt{130757.3}$
$d=361.1$

$d=\sqrt{(101-120)^2+(7.8-40)^2}$
$d=\sqrt{1417.3}$
$d=37.6$

$d=\sqrt{(101-300)^2+(7.8-30)^2}$
$d=\sqrt{307.3}$
$d=101.5$

$d=\sqrt{(101-280)^2+(7.8-45)^2}$
$d=\sqrt{33447.3}$
$d=182.9$

$d=\sqrt{(101-100)^2+(7.8-9)^2}$
$d=\sqrt{83.3}$
$d=9.1$

$d=\sqrt{(101-100)^2+(7.8-9)^2}$
$d=\sqrt{1.25}$
$d=1.1$

$d=\sqrt{(101-260)^2+(7.8-42)^2}$
$d=\sqrt{26471.3}$
$d=162.7$

$d=\sqrt{(101-480)^2+(7.8-95)^2}$
$d=\sqrt{109417.3}$
$d=330.8$

d2

$d=\sqrt{(380-380)^2+(82.5-85)^2}$
$d=\sqrt{6.25}$
$d=2.5$

$d=\sqrt{(380-400)^2+(82.5-90)^2}$
$d=\sqrt{456.25}$
$d=21.4$

$d=\sqrt{(380-350)^2+(82.5-80)^2}$
$d=\sqrt{906.25}$
$d=30.1$

$d=\sqrt{(380-240)^2+(82.5-39)^2}$
$d=\sqrt{21850.3}$
$d=146.9$

$d=\sqrt{(380-95)^2+(82.5-7)^2}$
$d=\sqrt{86925.3}$
$d=294.8$

$d=\sqrt{(380-80)^2+(82.5-5)^2}$
$d=\sqrt{96006.25}$
$d=310$

$d=\sqrt{(380-220)^2+(82.5-35)^2}$
$d=\sqrt{27856.3}$
$d=167$

$d=\sqrt{(380-450)^2+(82.5-100)^2}$
$d=\sqrt{5206.3}$
$d=72.2$

$d=\sqrt{(380-120)^2+(82.5-40)^2}$
$d=\sqrt{72856.3}$
$d=269.9$

$d=\sqrt{(380-280)^2+(82.5-30)^2}$
$d=\sqrt{35156.3}$
$d=187.5$

$d=\sqrt{(380-280)^2+(82.5-45)^2}$
$d=\sqrt{11406.25}$
$d=106.8$

$d=\sqrt{(380-110)^2+(82.5+9)^2}$
$d=\sqrt{78302.3}$
$d=279.8$

$d=\sqrt{(380-100)^2+(82.5+8)^2}$
$d=\sqrt{83950.3}$
$d=289.7$

$d=\sqrt{(380-260)^2+(82.5-42)^2}$
$d=\sqrt{16040.3}$
$d=126.7$

$d=\sqrt{(380-420)^2+(82.5-95)^2}$
$d=\sqrt{1756.3}$
$d=41.9$

NO.:
DATE:

d3

$d = \sqrt{(230-860)^2+(36.3-85)^2}$
$d = \sqrt{24871.7}$
$d = 157.7$

$d = \sqrt{(230-400)^2+(36.3-90)^2}$
$d = \sqrt{31784.1}$
$d = 178.3$

$d = \sqrt{(230-350)^2+(36.3-60)^2}$
$d = \sqrt{16314.1}$
$d = 127.7$

$d = \sqrt{(230-240)^2+(36.3-38)^2}$
$d = \sqrt{102.9}$
$d = 10.1$

$d = \sqrt{(230-95)^2+(36.3-7)^2}$
$d = \sqrt{19087.5}$
$d = 138.1$

$d = \sqrt{(230-80)^2+(36.3-5)^2}$
$d = \sqrt{23476.6}$
$d = 53.2$

$d = \sqrt{(230-220)^2+(36.3-35)^2}$
$d = \sqrt{101.6}$
$d = 10.1$

$d = \sqrt{(230-450)^2+(36.3-100)^2}$
$d = \sqrt{52469.1}$
$d = 229.1$

$d = \sqrt{(230-120)^2+(36.3+10)^2}$
$d = \sqrt{12791.7}$
$d = 113.1$

$d = \sqrt{(230-240)^2+(36.3-30)^2}$
$d = \sqrt{939.7}$
$d = 30.7$

$d = \sqrt{(230-280)^2+(36.3-45)^2}$
$d = \sqrt{2876.6}$
$d = 50.7$

$d = \sqrt{(230-110)^2+(36.3-8)^2}$
$d = \sqrt{15142.6}$
$d = 123.06$

$d = \sqrt{(230-130)^2+(30.7-8)^2}$
$d = \sqrt{17698.1}$
$d = 133.$

$d = \sqrt{(230-260)^2+(36.3-42)^2}$
$d = \sqrt{932.5}$
$d = 30.5$

$d = \sqrt{(230-120)^2+(36.3-95)^2}$
$d = \sqrt{39545.7}$
$d = 198.9$