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COM232

GIVEN:

ADVANCED MACHINE LEARNING
EXERCISE 2

CUSTOMER	Avg Bet per Visit (USD)	Visits per Month
A	10	1
B	20	2
C	55	6
D	70	8
E	60	10
F	35	4

① Compute all pairwise Euclidean distances between customers

$$d(A, B) = \sqrt{(10-20)^2 + (1-2)^2}$$

$$d(A, B) = 10.05$$

$$d(A, C) = \sqrt{(10-55)^2 + (1-6)^2}$$

$$d(A, C) = 45.28$$

$$d(A, D) = \sqrt{(10-70)^2 + (1-8)^2}$$

$$d(A, D) = 60.41$$

$$d(A, E) = \sqrt{(10-60)^2 + (1-10)^2}$$

$$d(A, E) = 50.80$$

$$d(A, F) = \sqrt{(10-35)^2 + (1-4)^2}$$

$$d(A, F) = 25.18$$

$$d(B, C) = \sqrt{(20-55)^2 + (2-6)^2}$$

$$d(B, C) = 35.23$$

$$d(B, D) = \sqrt{(20-70)^2 + (2-8)^2}$$

$$d(B, D) = 50.36$$

$$d(B, E) = \sqrt{(20-60)^2 + (2-10)^2}$$

$$d(B, E) = 40.79$$

$$d(B, F) = \sqrt{(20-35)^2 + (2-4)^2}$$

$$d(B, F) = 15.13$$

$$d(D, E) = \sqrt{(70-60)^2 + (8-10)^2}$$

$$d(D, E) = 10.20$$

$$d(D, F) = \sqrt{(70-35)^2 + (8-4)^2}$$

$$d(D, F) = 35.23$$

$$d(E, F) = \sqrt{(60-35)^2 + (10-4)^2}$$

$$d(E, F) = 25.71$$

② Create a matrix that will contain all the distances

	A	B	C	D	E	F
A	0	10.05	45.28	60.41	50.80	25.18
B	10.05	0	35.23	50.36	40.79	15.13
C	45.28	35.23	0	15.13	6.40	20.10
D	60.41	50.36	15.13	0	10.20	35.23
E	50.80	40.79	6.40	10.20	0	25.71
F	25.18	15.13	20.10	35.23	25.71	0

③ Using single linkage, determine the merging order step by step

C - E

A - B

AB - F

CE - D

ABF - CED

④ Record the distance at which each merge occurs

C - E = 6.40

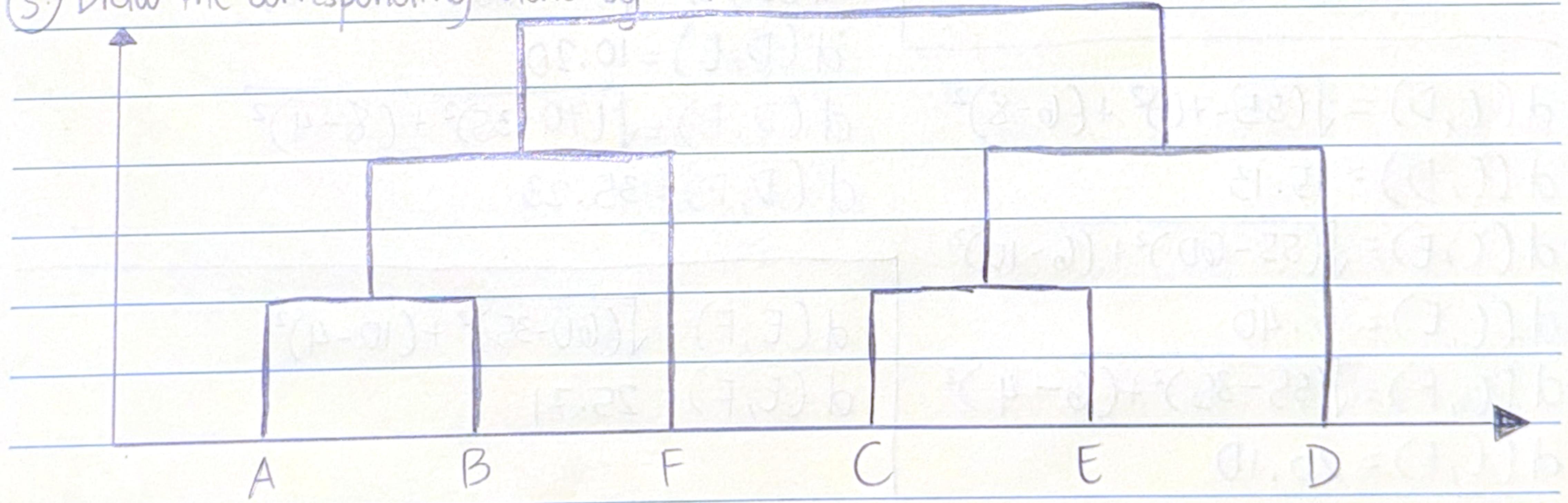
A - B = 10.05

AB - F = 15.13

CE - D = 15.13

ABF - CED = 20.10

⑤ Draw the corresponding dendrogram



⑥ Interpret the clusters. What customer behavior does each cluster represent?

The clusters ABF and CED makes the most sense, meaning by dividing the dataset into two clusters, we can interpret some insights. The first cluster, ABF, are the casual casino goer because they visit less and spend less. The CED cluster are the addicted one because they visit the casino more often and bet higher.

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For the addicted cluster or CED, we can offer them a referral incentives. Given that they are huge spenders, the possibility of them having big time or rich acquaintances is not impossible. By giving them rewards for referral, we can gain more high value customers.

For the casual goers, we can track when they come to the casino. For example, if they only come to casino after pay day, we can give them custom vouchers that will make them come back even it's not pay day yet. Like "come to the casino for 3 consecutive days and earn a free spin!"