ComS 574 HW6

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Problem 1: Ch 10, #2:

We have, $d(x,y) =$

	1	2	3	4
1	0	0.3	0.4	0.7
2	0.3	0	0.5	0.8
3	0.4	0.5	0	0.45
4	0.7	0.8	0.45	0

a)

$\min d(i,j) = d(1,2) = 0.3 \Rightarrow 1 \Leftrightarrow 2$

$d((1,2),3) = \max(D(1,3), D(2,3)) = \max(0.4, 0.5) = 0.5$

$d((1,2),4) = \max(0.7, 0.8) = 0.8$

$d_1(i,j) =$

	(1,2)	3	4
(1,2)	0	0.5	0.8
3	0.5	0	0.45
4	0.8	0.45	0

$\min d(i,j) = 0.45 = d(3,4)$

$d((1,2),(3,4)) = \max(0.5, 0.8) = 0.8$

$d_2(i,j) =$

	(1,2)	(3,4)
(1,2)	0	0.8
(3,4)	0.8	0

b) $\min d(i,j) = d(1,2) = 0.3 \Rightarrow 1$ is connected with 2

$d((1,2),3) = \min(d(1,3), d(2,3)) = \min(0.4, 0.5)$
$= 0.4$

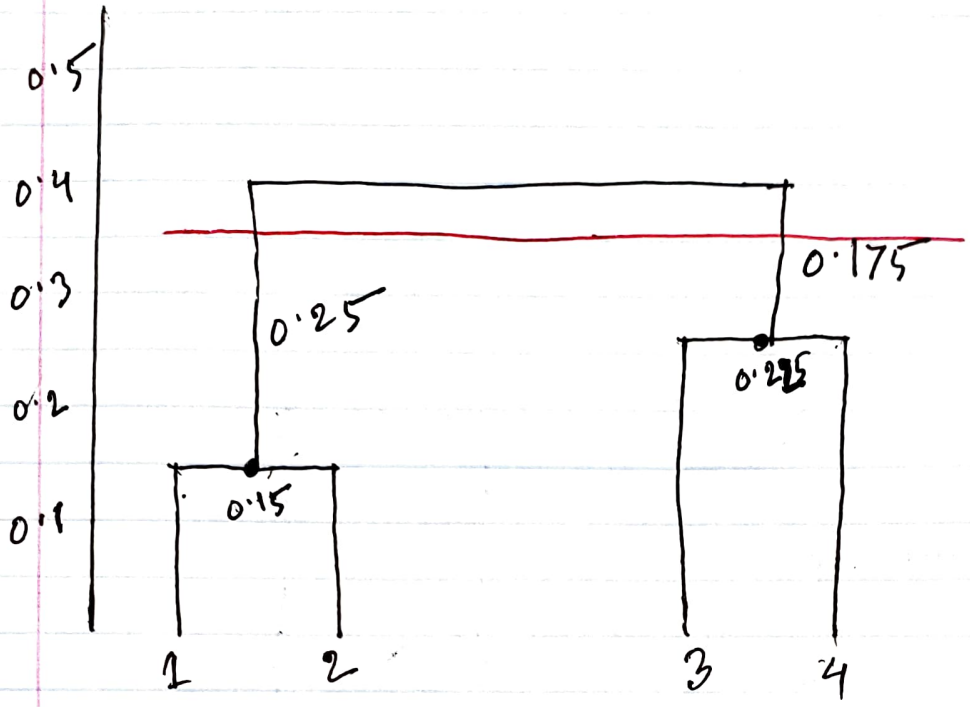
$d((1,2),4) = \min(0.7, 0.8) = 0.7$

$$d_1(i,j) = \begin{array}{c} \\ (1,2) \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{ccc} (1,2) & 3 & 4 \end{array} \\ \begin{bmatrix} 0 & 0.4 & 0.7 \\ 0.4 & 0 & 0.45 \\ 0.7 & 0.45 & 0 \end{bmatrix} \end{array}$$

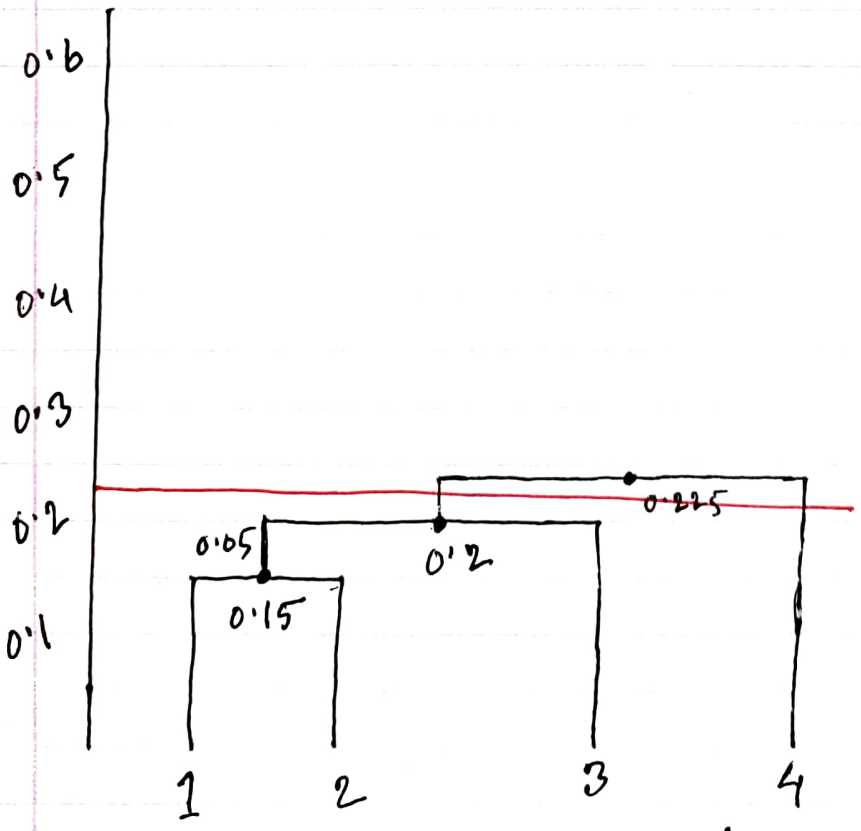
$\min d(i,j) = d((1,2),3) = 0.4 \Rightarrow (1,2) \Leftrightarrow 3$

$d(((1,2),3),4) = \min(d((1,2),4), d(3,4))$
$= \min(0.7, 0.45) = 0.45$

$$d_2(i,j) = \begin{array}{c} \\ ((1,2),3) \\ 4 \end{array} \begin{array}{c} \begin{array}{cc} ((1,2),3) & 4 \end{array} \\ \begin{bmatrix} 0 & 0.45 \\ 0.45 & 0 \end{bmatrix} \end{array}$$



Plot: Complete Linkage



Plot: Single Linkage.

(c) Cluster 1: 1, 2
Cluster 2: 3, 4

d) Cluster 1: 1, 2, 3
Cluster 2: 4

e)