

Que 1)

a) Given,

Step -1

	x_1	x_2	x_3	x_4	x_5	x_6
x_1	0					
x_2	0.12	0				
x_3	0.51	0.25	0			
x_4	0.84	0.16	0.14	0		
x_5	0.28	0.77	0.70	0.45	0	
x_6	0.34	0.61	0.93	0.20	0.67	0

minimum hint - $[x_3, (x_1, x_2)] = \min ((x_3, x_1), (x_3, x_2))$

	(x_1, x_2)	x_3	x_4	x_5	x_6
(x_1, x_2)	0	.			
x_3	0.25	0			
x_4	0.16	0.14	0		
x_5	0.28	0.70	0.45	0	
x_6	0.34	0.93	0.20	0.67	0

Step -3

Merging (x_4, x_3)

	(x_1, x_2)	x_3, x_4	x_5	x_6
x_1, x_2	0			
x_3, x_4	0.16	0		
x_5	0.28	0.45	0	
x_6	0.34	0.20	0.67	0

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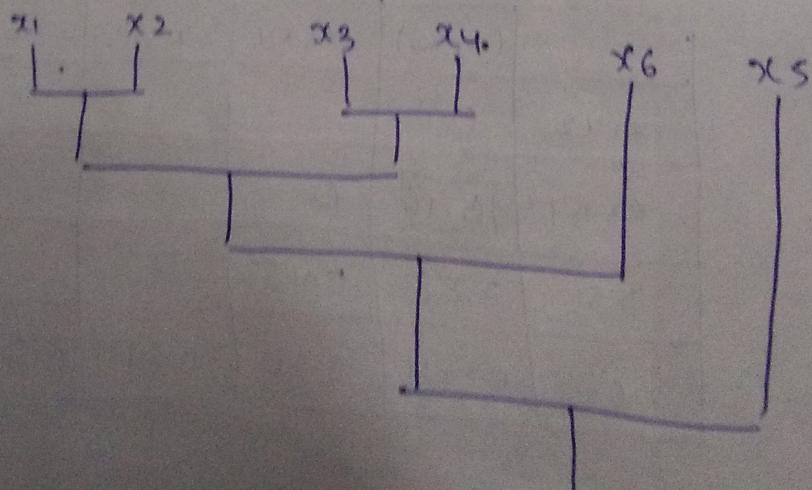
Step-4

x_1	x_2	x_3	x_4	x_5	x_6
$x_1 x_2 x_3 x_4$				0	
0.25		0.28		0	
x_6		0.2	0.67	0	

Step-5

	$x_1 x_2 x_3 x_4 x_6$	x_5
$x_1 x_2 x_3 x_4 x_6$	0	
x_5	0.28	0

Final dendrogram



Dendrogram with complete link

Instead of taking minimum, here we will take maximum

$$d(x_1, x_3) = 0.51$$

$$d(x_2, x_3) = 0.25$$

$$d(x_1, x_2, x_3) = \max(0.51, 0.25) = 0.51$$

Step-1

	x_1	x_2	x_3	x_4	x_5	x_6
x_1	0					
x_2	0.12	0				
x_3	0.51	0.25	0			
x_4	0.84	0.16	0.14	0		
x_5	0.28	0.77	0.70	0.45	0	
x_6	0.34	0.61	0.93	0.2	0.67	0

Step-2

	x_1, x_2	x_3	x_4	x_5	x_6
x_5	0
x_3	0.51	0	.	.	.
x_4	0.84	0.14	0	.	.
x_5	0.77	0.70	0.45	0	.
x_6	0.61	0.93	0.20	0.67	0

Step-3

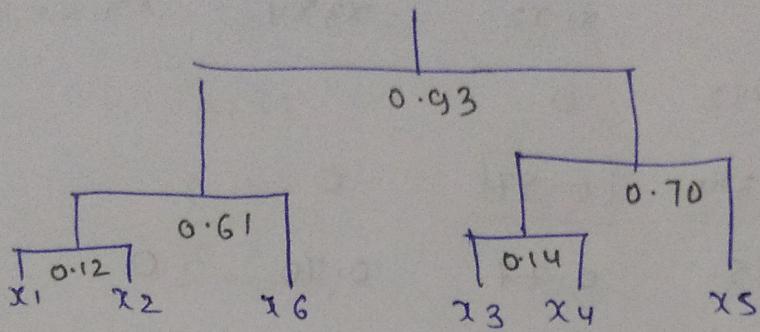
	x_1x_2	x_3x_4	x_5	x_6
x_1x_2	0			
x_3x_4	0.84	0		
x_5	0.77	0.70	0	
x_6	0.61	0.93	0.67	0

Step-4

	$x_1x_2x_6$	x_3x_4	x_5
$x_1x_2x_6$	0		
x_3x_4	0.93	0	
x_5	0.77	0.70	0

Step-5

	$x_1x_2x_6$	$x_3x_4x_5$
$x_1x_2x_6$	0	
$x_3x_4x_5$	0.93	0



c)

change 2 values from matrix, such that answer from both single link & complete link is same :-

1st change comes when

$$d[(x_1, x_2) (x_3, x_4)] = 0.16 \text{ (in single link)}$$

$$d[(x_1, x_2) (x_3, x_4)] = \underbrace{0.84}_{\downarrow \text{greater than } 0.61}$$

So, lets change the value of

$$d[(x_1, x_2) (x_3, x_4)] = 0.57 = d[x_1, x_4]$$

in complete link

2nd change comes when

in single $d[x_5, (x_1, x_2, x_3, x_4, x_6)] = 0.25$

$$d[x_5, (x_3, x_4)] = 0.70$$

after 1st change table will be

	$x_1 x_2$	$x_3 x_4$	x_5	x_6
$x_1 x_2$	0			
$x_3 x_4$	0.57	0		
x_5	0.77	0.70	0	
x_6	0.61	0.93	0.67	0

 $x_1 x_2 x_3 x_4$

x5

x6

but now, when $x_1 x_2 x_3 x_4$ center is spread

then x_5 should move towards x_6

$x_1 x_2 x_3 x_4$ x_5 x_6

 $x_1 x_2 x_3 x_4$ $x_1 x_2 x_3 x_4$

0

x5

 x_5

0

 x_6

0.93

0.67

0

Final

but $(x_1 x_2 x_3 x_4)$ and x_6 should be merged so,

decrease the $d[x_6, x_1 x_2 x_3 x_4]$

So, let it be 0.65

at $x_1 x_2$ So, change the original value of $d[x_3, x_6]$ to 0.65 instead of 0.93

x1

x2

x3

x4

x5

x6

$x_1 x_2 x_3 x_4$ x_5 x_6

$x_1 x_2 x_3 x_4$

0

x_5

0.77

x_6

0.93
0.65

0

0.67

0

11,

$x_1 x_2 x_3 x_4 x_6$ x_5

$x_1 x_2 x_3 x_4 x_6$

0

x_5

0.77

0

Final distance matrix

	x_1	x_2	x_3	x_4	x_5	x_6
x_1	0					
x_2	0.12	0				
x_3	0.51	0.25	0			
x_4	0.57	0.16	0.14	0		
x_5	0.28	0.77	0.70	0.45	0	
x_6	0.34	0.61	0.65	0.20	0.67	0

