

20.181

Homework #1 Solution

distance matrix:

	1	2	3	4	5
1	0				
2	5	0			
3	1	6	0		
4	3	4	4	0	
5	5	0	6	4	0

① join 2,5

new distance matrix:

$$d_{2,5 \rightarrow 1} = \frac{1}{2}(d_{2 \rightarrow 1} + d_{5 \rightarrow 1})$$

$$= \frac{1}{2}(5 + 5)$$

$$= 5$$

~~etc~~ etc...

	1	2,5	3	4
1	0			
2,5	5	0		
3	1	6	0	
4	3	4	4	0

(2 and 5 were identical, so this step is easy).

② next join 1,3

new distance matrix:

$$d_{1,3 \rightarrow 4} = \frac{1}{2}(d_{1 \rightarrow 4} + d_{3 \rightarrow 4})$$

$$= \frac{1}{2}(3 + 4)$$

$$= 3.5$$

	1,3	2,5	4
1,3	0		
2,5	5.5	0	
4	3.5	4	0

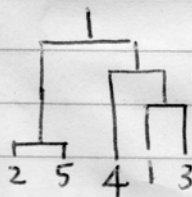
$$d_{1,3 \rightarrow 2,5} = \frac{1}{4}(d_{1 \rightarrow 2} + d_{1 \rightarrow 5} + d_{3 \rightarrow 2} + d_{3 \rightarrow 5})$$

$$= \frac{1}{4}(5 + 5 + 6 + 6)$$

$$= 5.5$$

③ join 4 to (1,3)

TREE →



OR

