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:

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

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

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

② next join 1,3

new distance matrix:

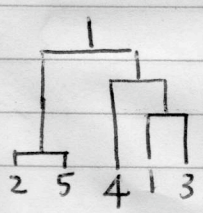
$d_{1,3\to 4} = \frac{1}{2}(d_{1\to 4} + d_{3\to 4})$
$= \frac{1}{2}(3 + 4)$
$= 3.5$

| | 1,3 | 2,5 | 4 |
|---|---|---|---|
| 1,3 | 0 | | |
| 2,5 | 5,5 | 0 | |
| 4 | 3,5 | 4 | 0 |

$d_{1,3\to 2,5} = \frac{1}{4}(d_{1\to 2} + d_{1\to 5} + d_{3\to 2} + d_{3\to 5})$
$= \frac{1}{4}(5 + 5 + 6 + 6)$
$= 5.5$

③ join 4 to (1,3)

TREE →




OR