(Q1)

node 0

Home tree = {0}

$d(0) = 0$

Guest nodes = {1, 2, 3, 4, 5, 6, 7, 8}, $d(\cdot) = \infty$

Distance to node 1 is 6

Distance to node 2 is 2

Update distance label: $d(1) = 6$, $d(2) = 2$

Find the closest guest node 2, because $d(2) = 2 < d(1) = 6$

Add node 2 and link $(0 \rightarrow 2)$ into home tree

node 2

Home tree = {0, 2} $d(\cdot) = \infty$

Guest nodes = {1, 3, 4, 7, 5, 6, 8}

Determine the distance to guest nodes connected to node 2:

Distance to node 3 = 2 + 8 = 10

Distance to node 4 = 2 + 10 = 12

Distance to node 7 = 2 + 20 = 22

Updated $d(3) = 10$, $d(4) = 12$, $d(7) = 22$

node 1

Home tree = {0, 1}, $d(0) = 0$, $d(1) = 6$

Guest nodes = {2, 3, 4, 7, 5, 6, 8} $d(\cdot) = \infty$

Distance 1-2 = 5 + 6 = 11

Distance 1-3 = 2 + 6 = 8

Updated $d(2) = 2$, $d(3) = 8$

node 3

Home tree : {0, 1, 2, 3} , d(0) = 0 d(1) = 6 d(2) = 2 d(3) = 8

Guest nodes : {4, 5, 6, 7, 8} d(·) = ∞

Distance: 3-4 = 3+8 = 11

Distance 3-5 = 8+7 = 15

Updated d(4) = 11 d(5) = 15

node 4

Home tree : {0, 1, 2, 3, 4} , d(0) = 0 d(1) = 6 d(2) = 2 d(3) = 8 d(4) = 11

Guest nodes : {5, 6, 7, 8} d(·) = ∞

Distance: 4-5 = 11 + 2 = 13

Distance : 4-7 = 11 + 6 = 17

Updated d(5) = 13 , d(7) = 17

node 7

Home tree : {0, 1, 2, 3, 4, 7} , d(0) = 0 d(1) = 6 d(2) = 2 d(3) = 8 d(4) = 11 d(7) = 17

Guest nodes : {5, 6, 8} d(·) = ∞

Distance 7-8 = 17 + 3 = 20

Updated d(8) = 20

Node 5

Home tree : {0, 1, 2, 3, 4, 5} , d(1) = 0, d(1) = 6 d(2) = 2 d(3) = 8 d(4) = 11 d(5) = 13

Guest nodes : {6, 7, 8} , d(·) = ∞

Distance 5-7 = 13 + 7 = 20

Distance 5-6 = 13 + 5 = 18

Updated d(7) = 17 , d(6) = 18

Node 6

Home tree : {0, 1, 2, 3, 4, 5, 6, 7}, d(0) = 0 , d(1) = 6 , d(2) = 2 , d(3) = 8, d(4) = 11 d(5) = 13 d(6) = 18 d(7) = 17

Guest nodes : {8}

Distance 6-8 = 18 + 4 = 22

Updated d(8) = 20

Home tree : { 0, 1, 2, 3, 4, 5, 6, 7, 8 }

Guest nodes : { }

The shortest path :

0 - 1 - 3 - 4 - 7 - 8