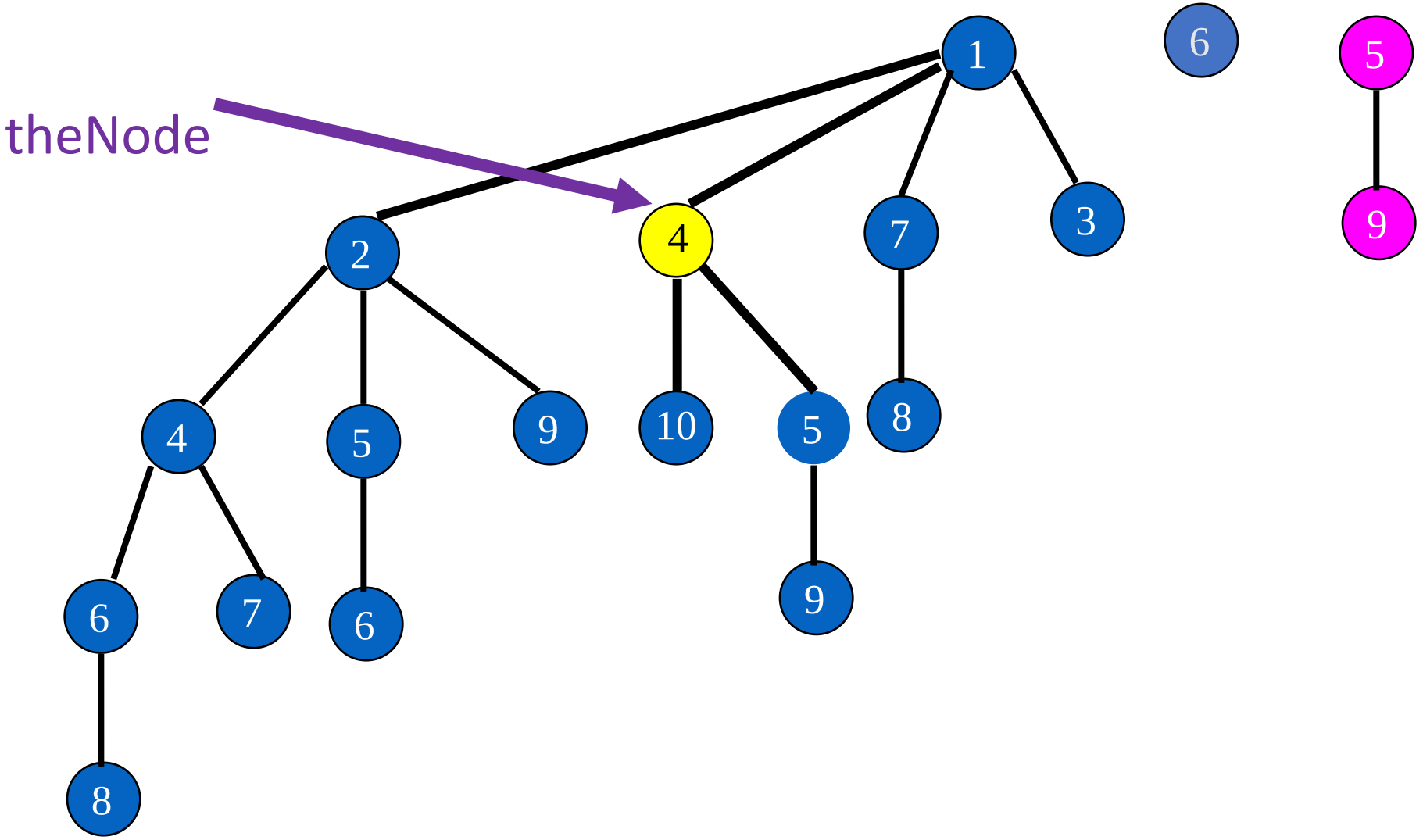
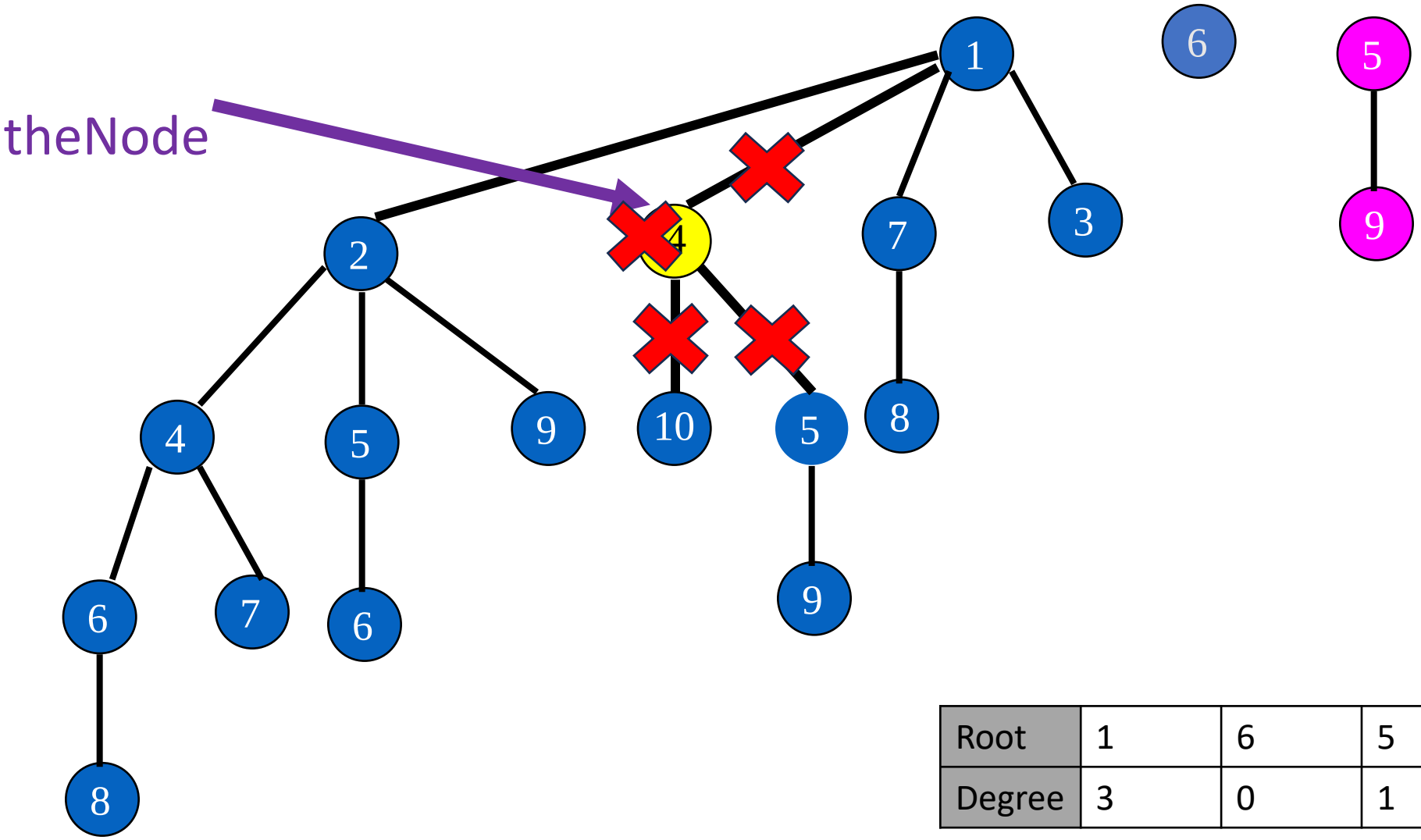
Fibonacci Heaps

- Q1: Delete 4 from the following Fibonacci heap. Please write out the roots and degrees of the min trees in the resulting F-heap.

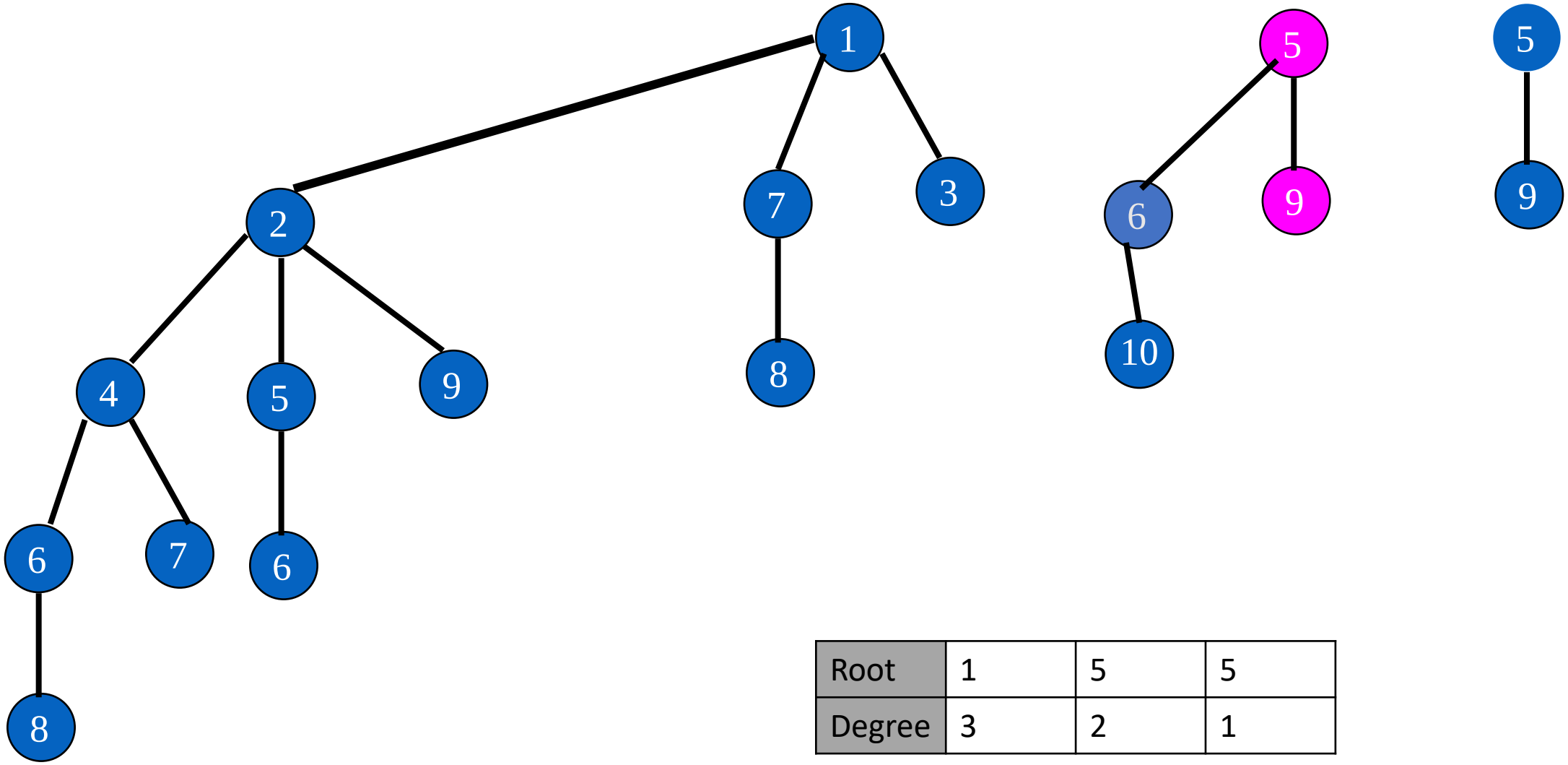


Without consolidation



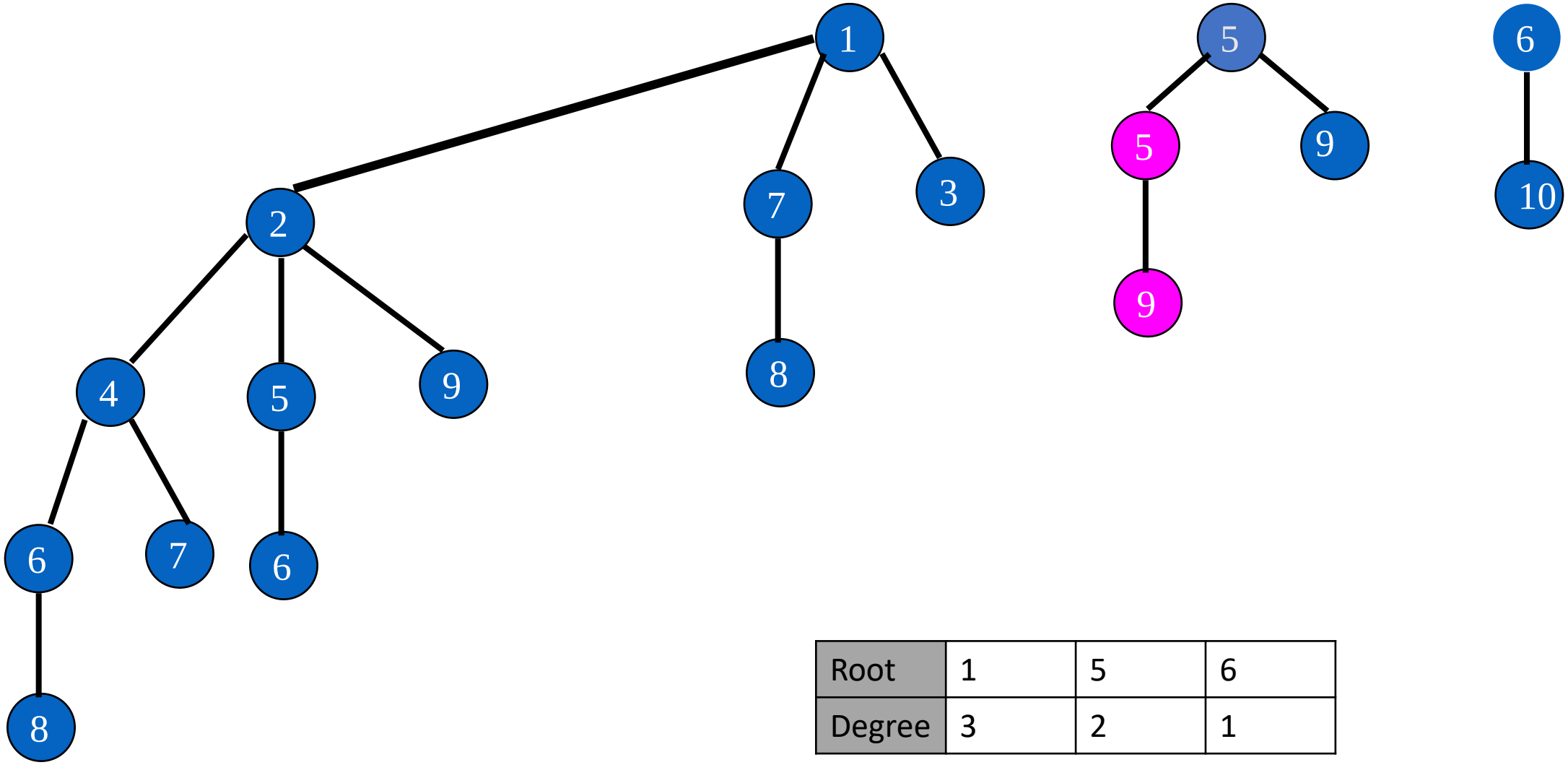
Root	1	6	5	10	5
Degree	3	0	1	0	1

With consolidation (V1)



Root	1	5	5
Degree	3	2	1

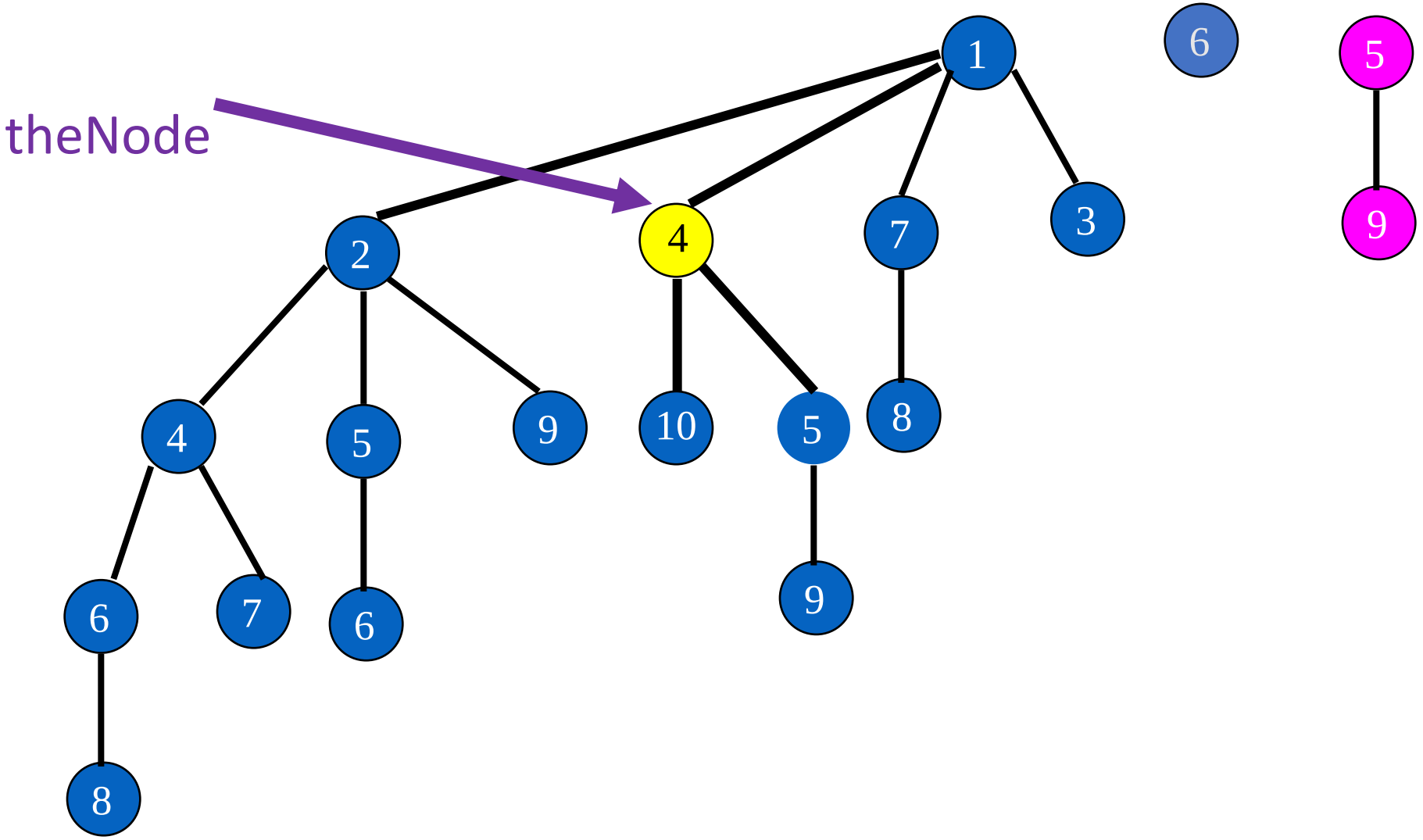
With consolidation (V2)



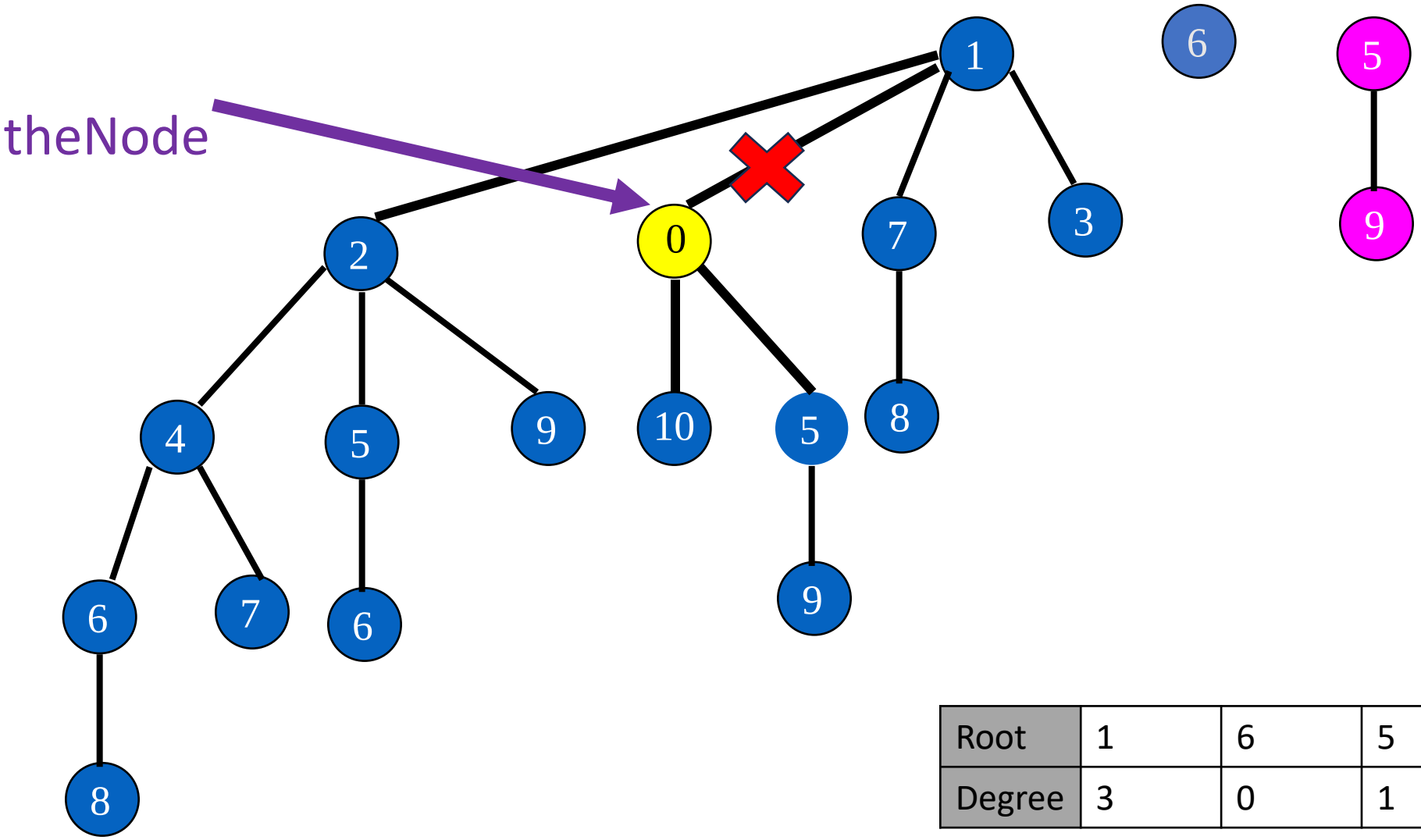
Root	1	5	6
Degree	3	2	1

Fibonacci Heaps

- Q2: Reduce the key 4 by 4 (that is, 4 becomes 0). Please write out the roots and degrees of the min trees in the resulting F-heap.



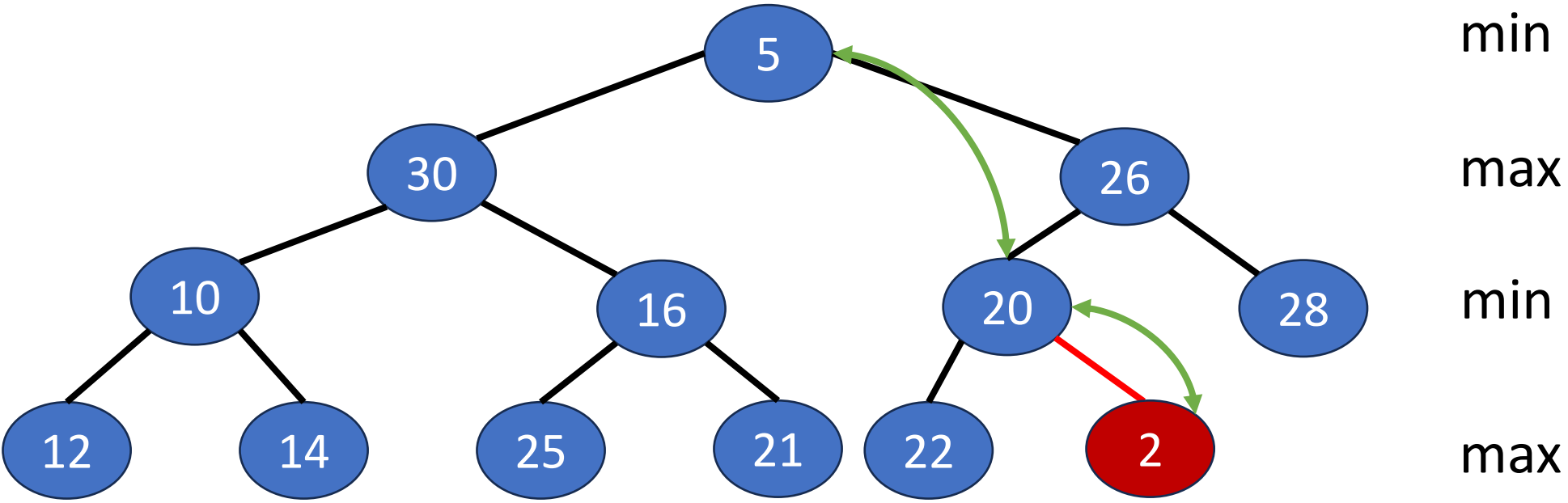
Decrease key from 4 to 0



Root	1	6	5	0
Degree	3	0	1	2

Min-max heap

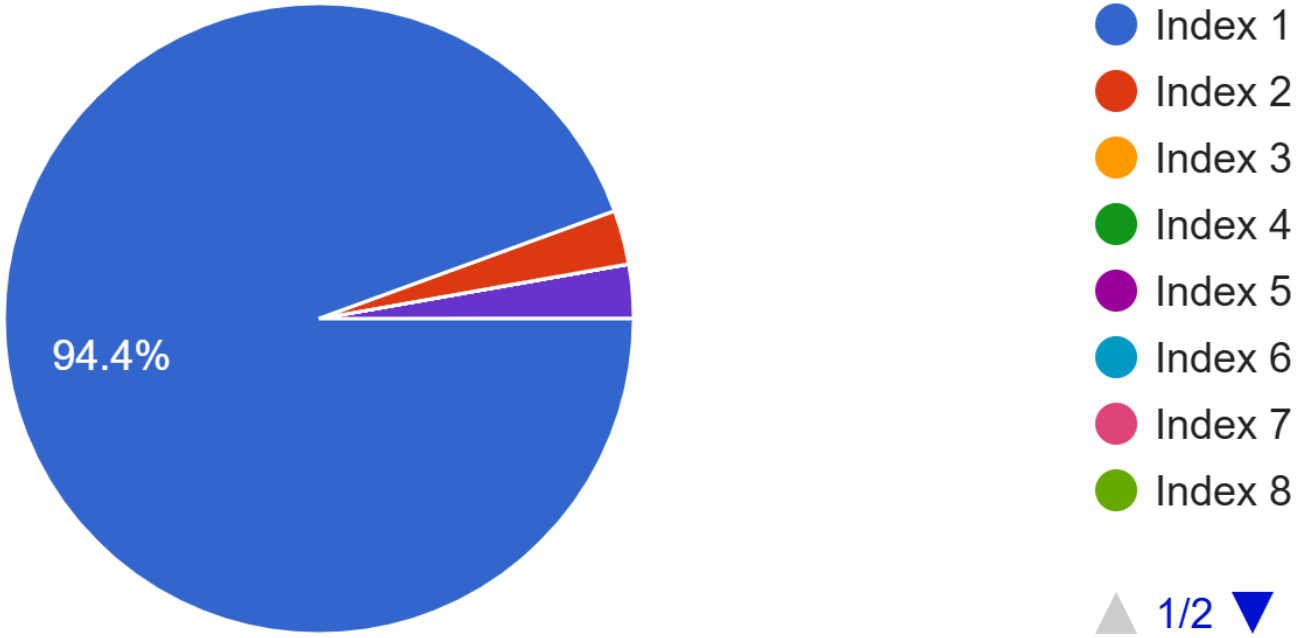
- Q3: Insert 2 into the following min-max heap. Where will be the location of 2?



The node with key 2 is at index 1.

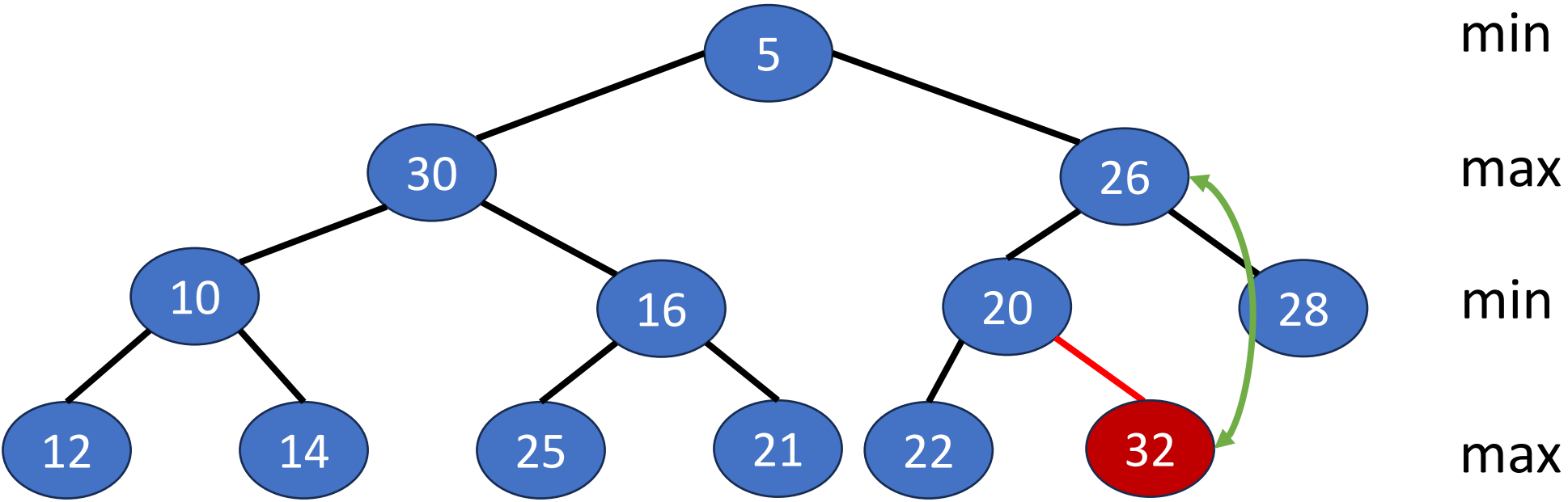
Min-max heap

- Q3: Insert 2 into the following min-max heap. Where will be the location of 2?



Min-max heap

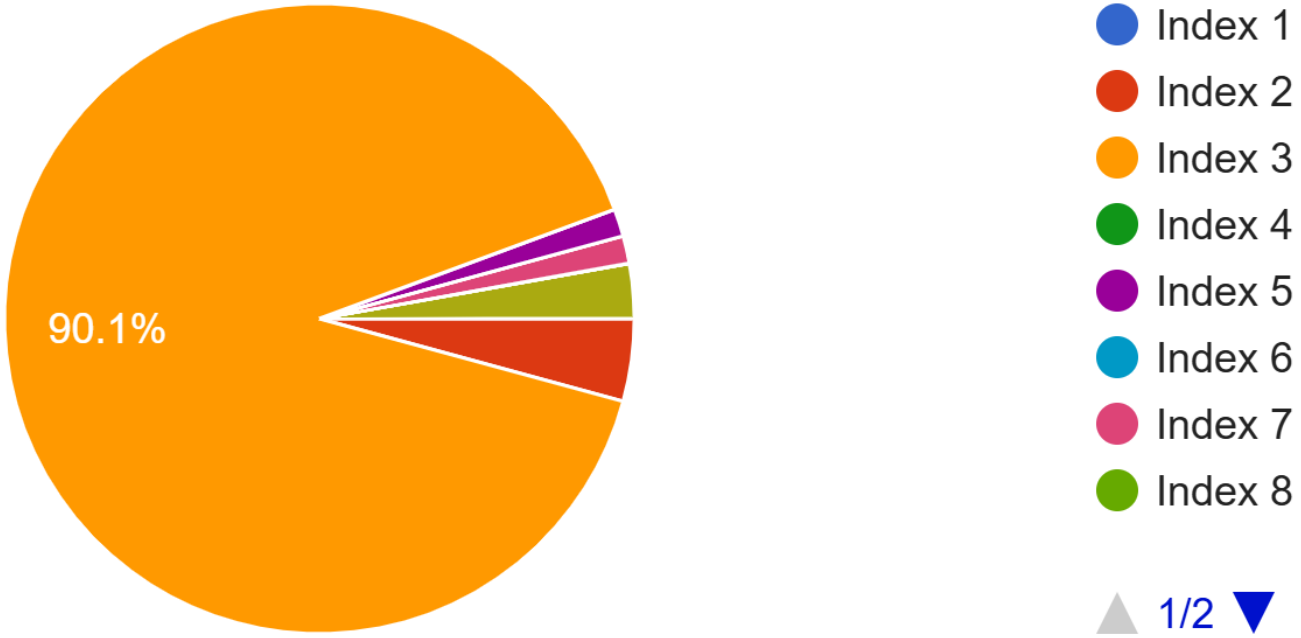
- Q4: Insert 32 into the following min-max heap. Where will be the location of 32?



The node with key 32 is at index 3.

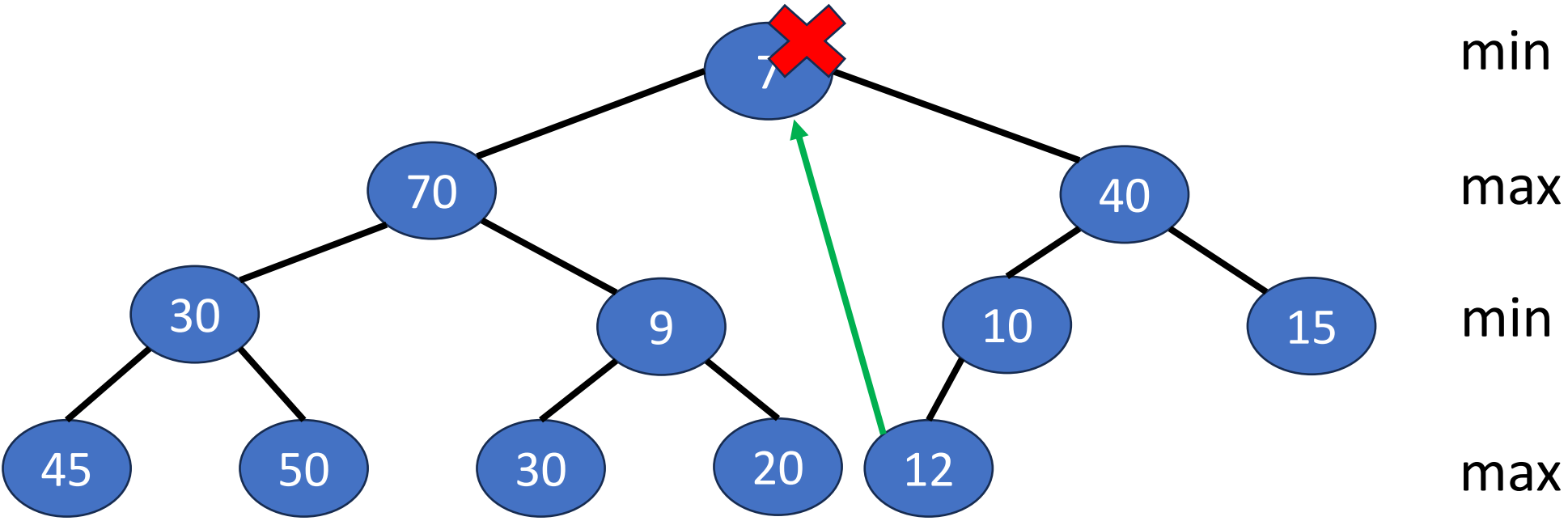
Min-max heap

- Q4: Insert 32 into the following min-max heap. Where will be the location of 32?

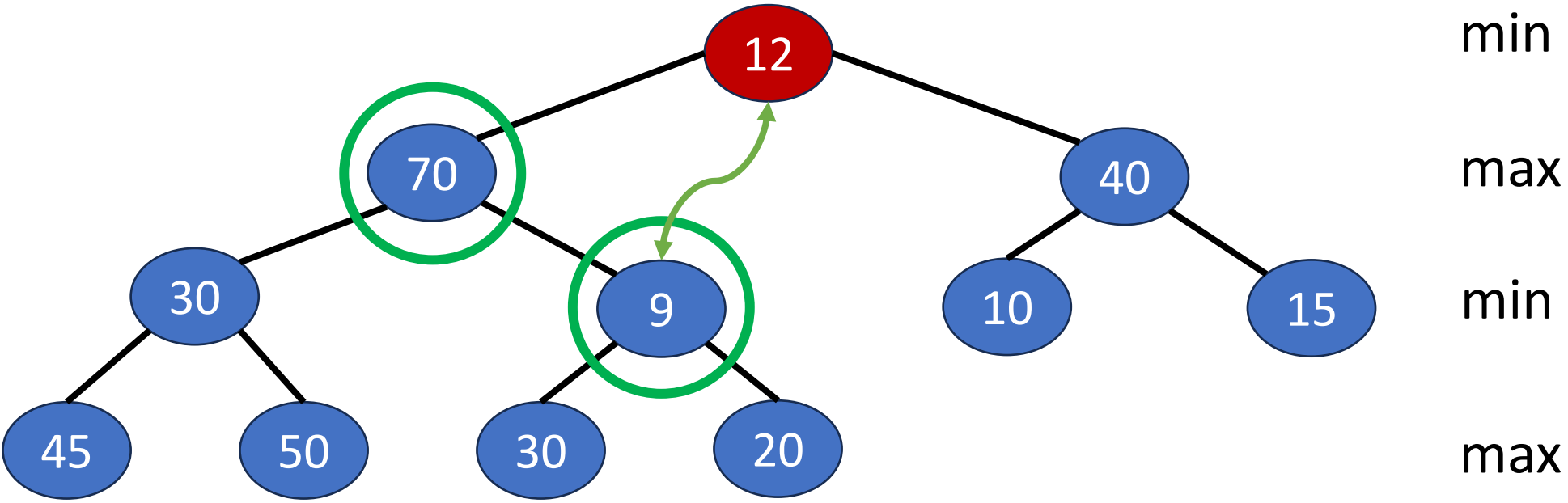


Min-max heap

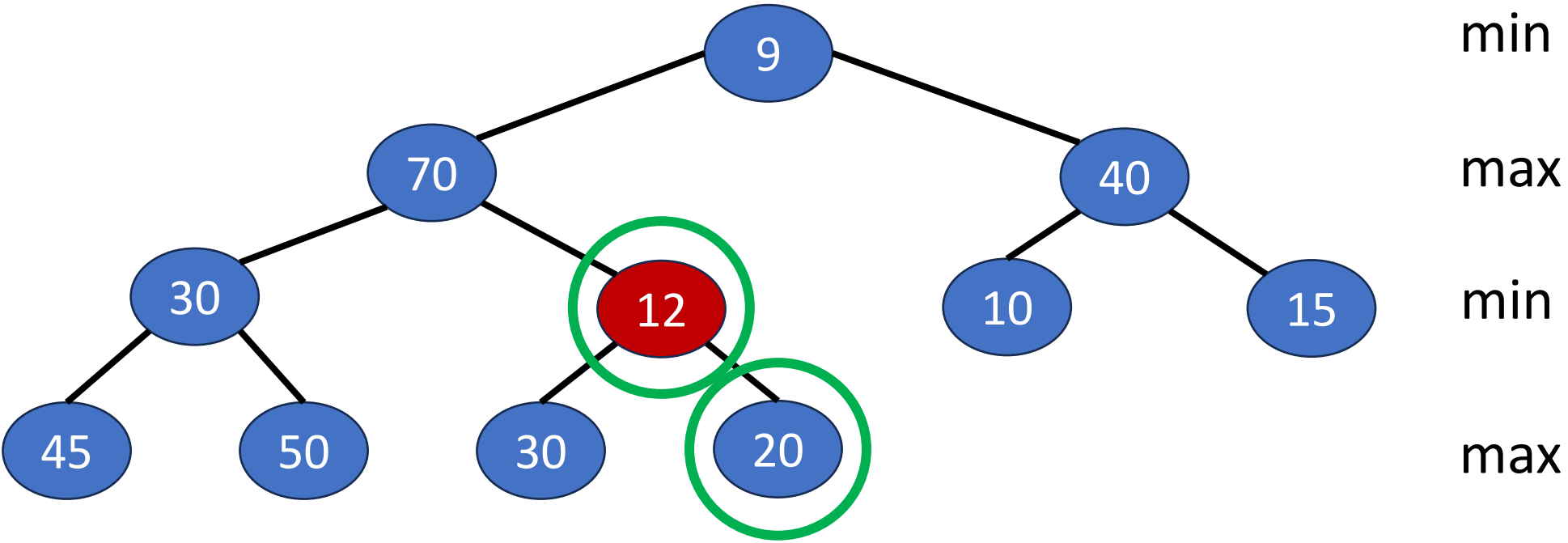
- Q5: Remove min from the following min-max heap. Where will be the location of 12?



Min-max heap



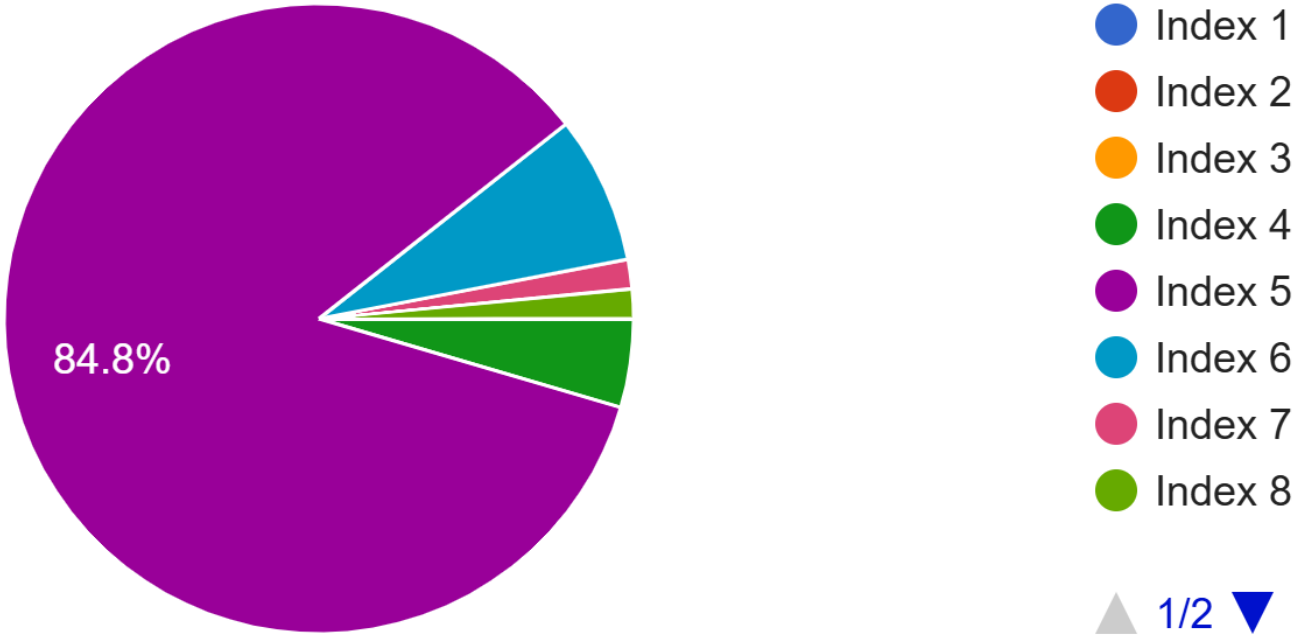
Min-max heap



The node with key 12 is at index 5.

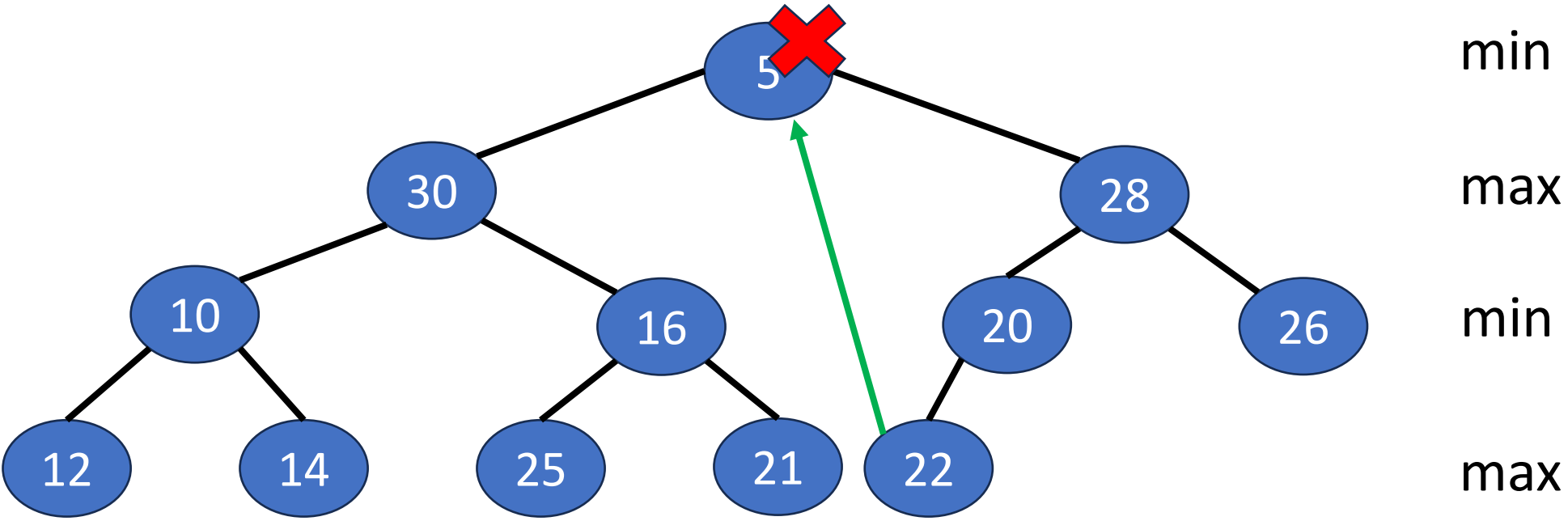
Min-max heap

- Q5: Remove min from the following min-max heap. Where will be the location of 12?

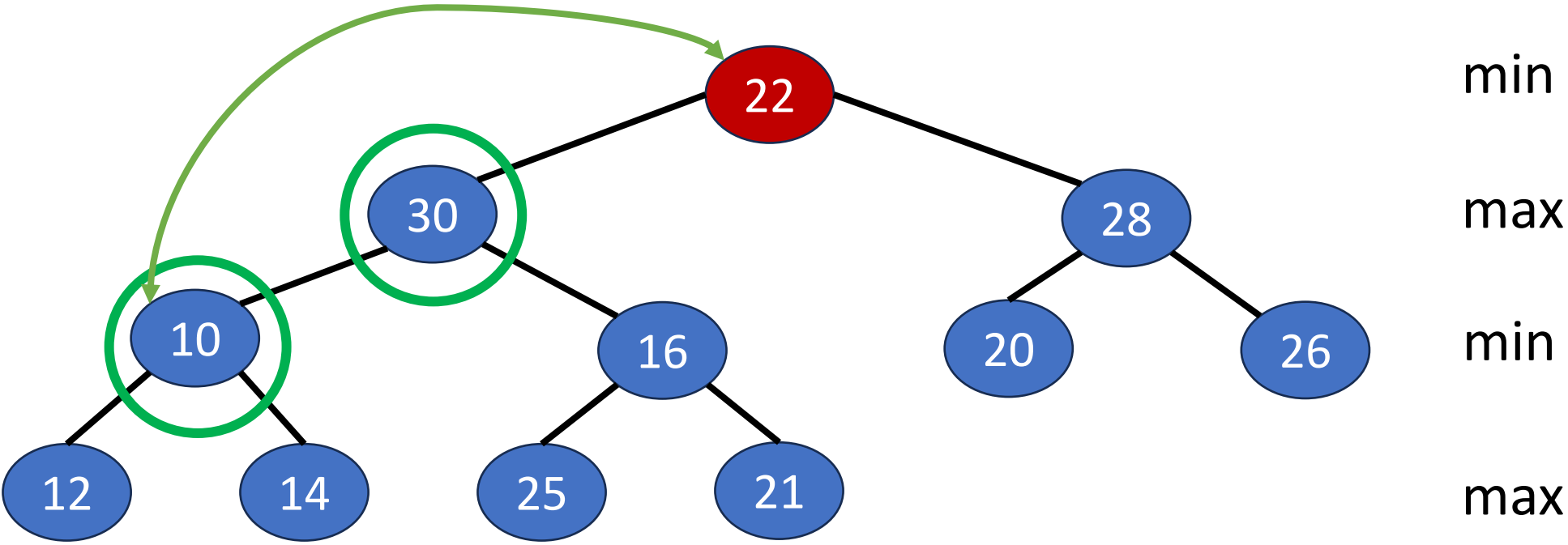


Min-max heap

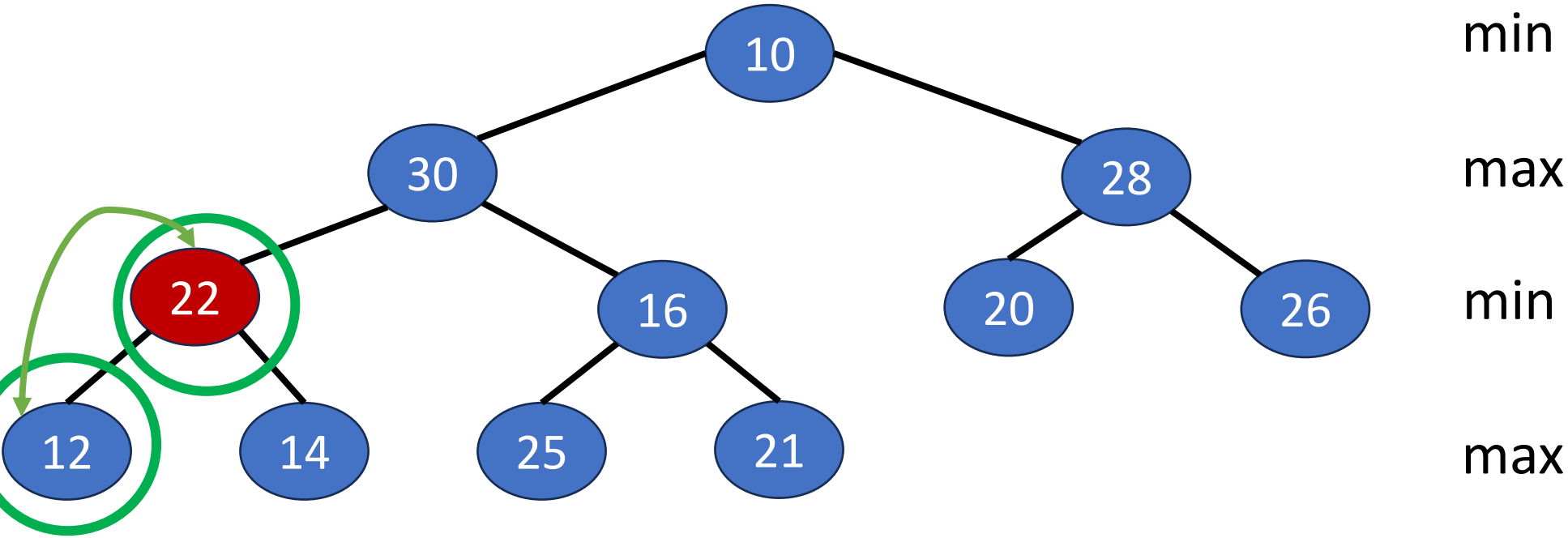
- Q6: Remove min from the following min-max heap. Where will be the location of 22?



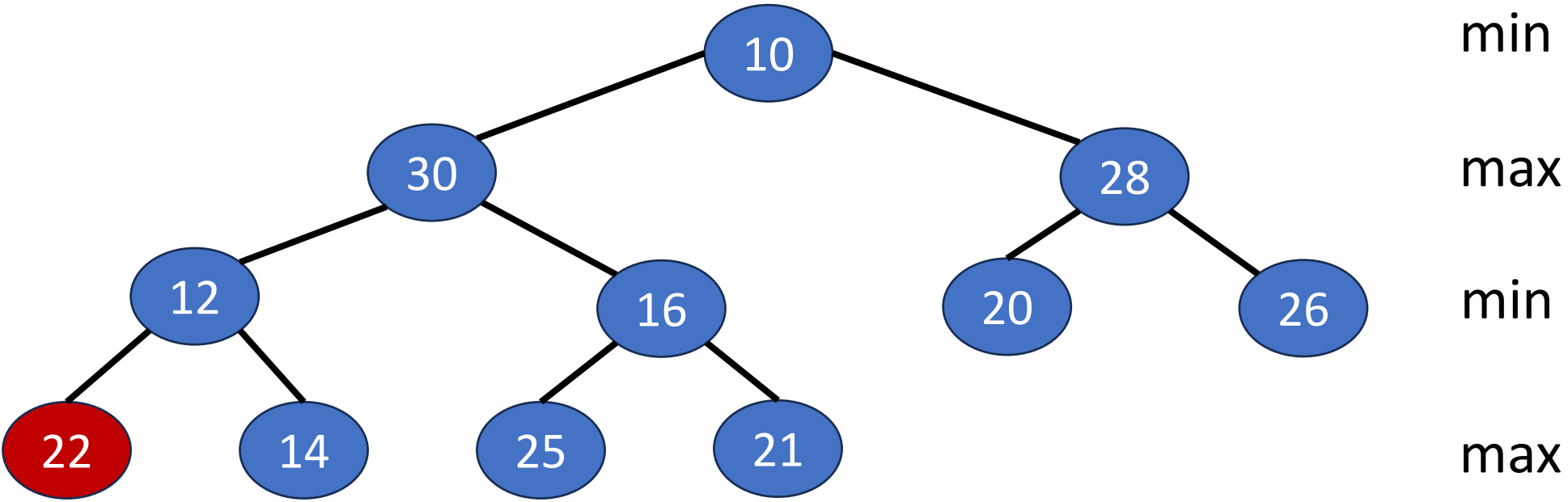
Min-max heap



Min-max heap



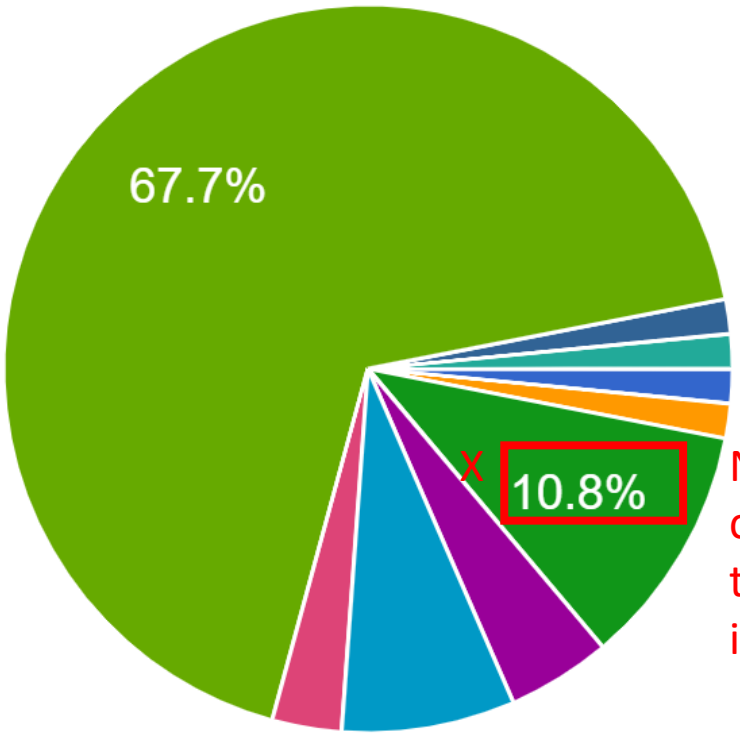
Min-max heap



The node with key 22 is at index 8.

Min-max heap

- Q6: Remove min from the following min-max heap. Where will be the location of 22?



Note: The update should continue for the subtree if the root's key is larger than its grandchild's key.