

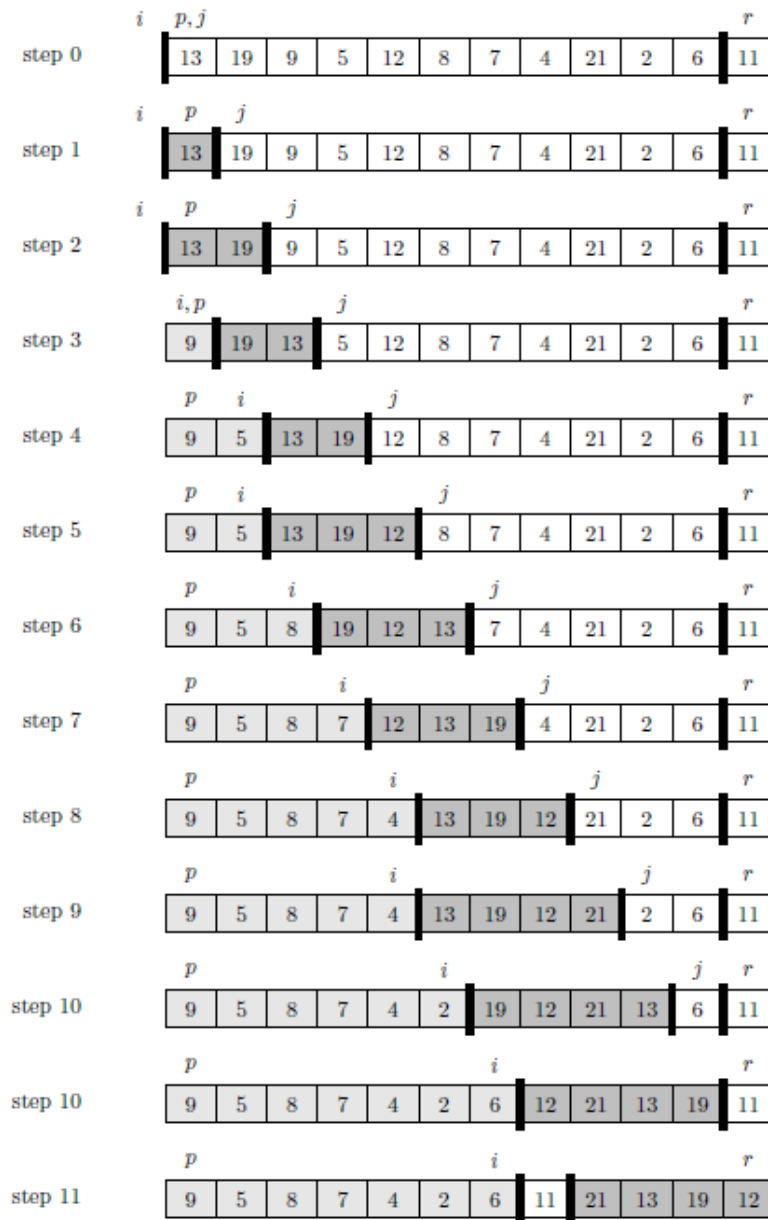
Training Problems #5 Solutions

Chapter 7:

1. Illustrate the operation of PARTITION on the array $A = \langle 13, 19, 9, 5, 12, 8, 7, 4, 21, 2, 6, 11 \rangle$. Show how the array would look like, step by step. You can assume array index starts at 1

Solution:

We follow Figure 7.1 with the given array. Step 0 has the array in the given order, and step 11 has the array in the final order.



The procedure returns the index value $i + 1 = p + 7$. ■

2. After running PARTITION on Problem #1, what value does the PARTITION method return? Assume array index starts at 1.

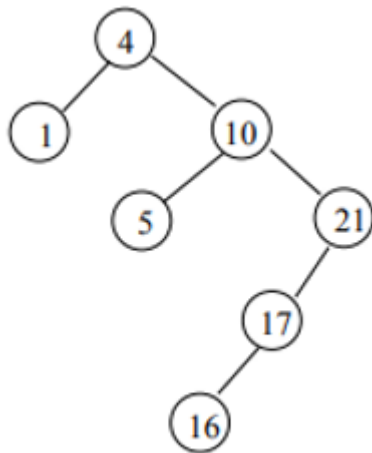
Solution:

The procedure returns the index value $i + 1 = 7 + 1 = 8$.

Chapter 12:

For questions 3 to 8, provide the resultant tree and explain what you did.

3. Delete node 21 from the below tree:



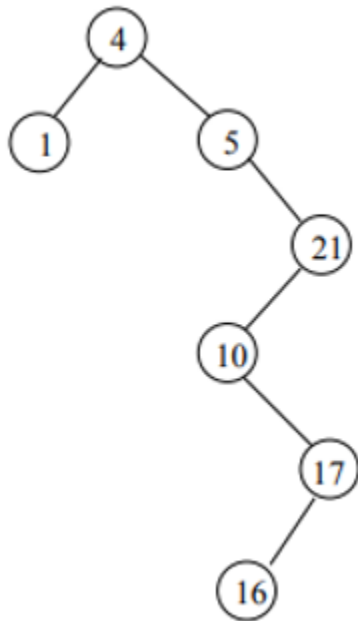
Solution:

Node 21 is deleted. Right child of node 10 becomes node 17's parent.

Resulting tree:



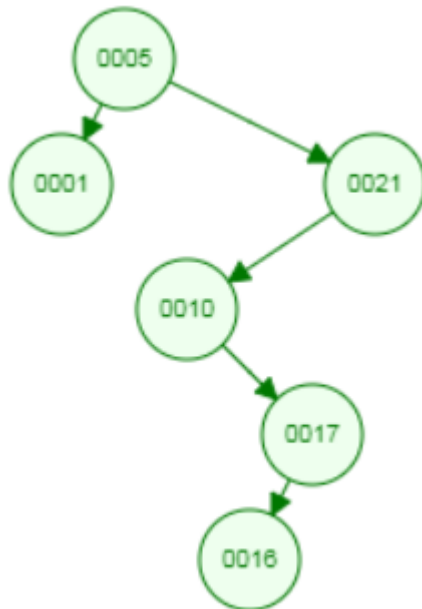
4. Delete node 4 from the below tree:



Solution:

Delete node 4 and replace with next biggest node, 5. Because 5 was the right child of 4, all of node 5's children will remain the same.

Resulting tree:

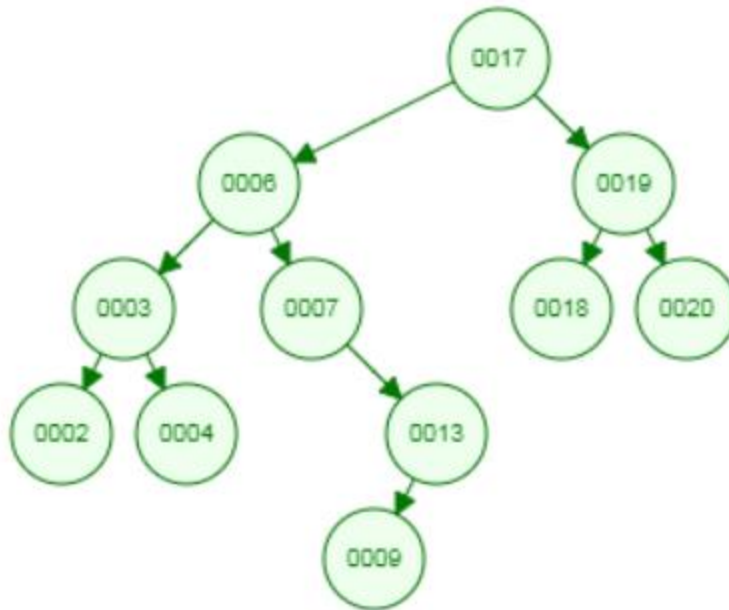


5. Delete node 15 from the below tree.

Solution:

Since the next biggest node, 17, is not node 15's right child, replace node 17 with its Right child, 18. Then replace node 15 with node 17.

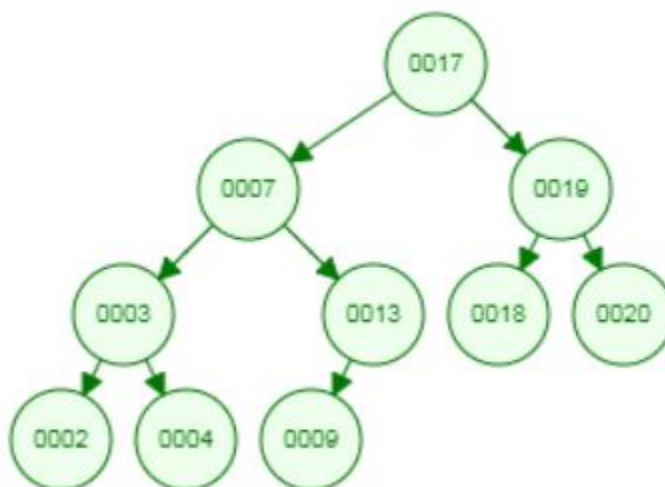
Resulting tree:



6. Then delete node 6 from the tree.

Solution:

Delete node 6 and replace with next biggest node, 7. Because 7 was the right child of 6, all of node 7's children will remain the same.

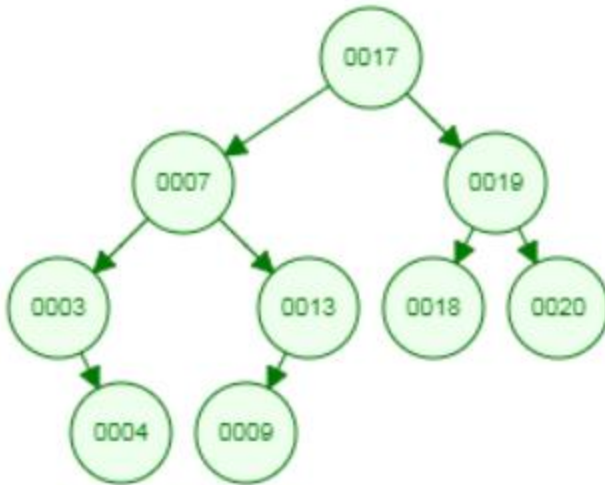


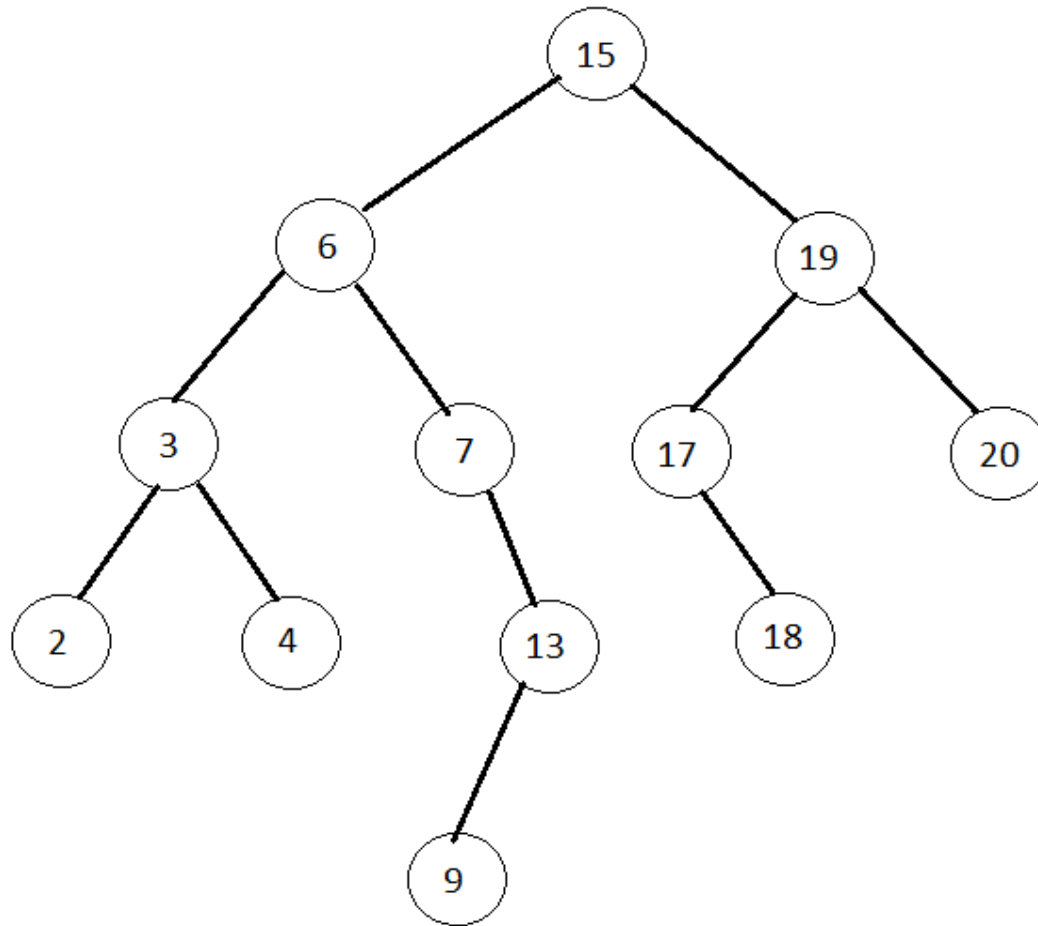
- Then delete node 2 from the tree.

Solution:

Since node 2 is a leaf, you can just delete it (replace the node with NIL).

Resulting tree:





8. Provide the In Order, Pre Order, and Post Order traversal of the above tree (without the deletions).

Solution:

In Order:

2, 3, 4, 6, 7, 9, 13, 15, 17, 18, 19, 20

Pre Order:

15, 6, 3, 2, 4, 7, 13, 9, 19, 17, 18, 20

Post Order:

2, 4, 3, 9, 13, 7, 6, 18, 17, 20, 19, 15