Data Structures and Algorithms II

D/BCS/19/0018

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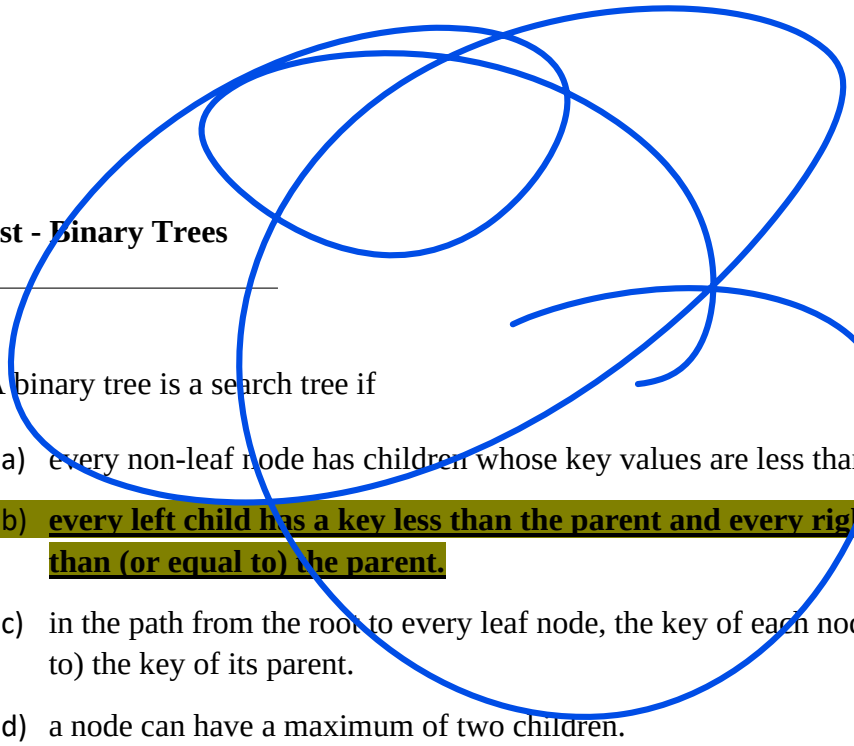

Self Test - Binary Trees

1. A binary tree is a search tree if

   (a) every non-leaf node has children whose key values are less than (or equal to) the parent.

   (b) **every left child has a key less than the parent and every right child has a key greater than (or equal to) the parent.**

   (c) in the path from the root to every leaf node, the key of each node is greater than (or equal to) the key of its parent.

   (d) a node can have a maximum of two children.

2. A subtree of a binary tree always has

   (a) a root that is a child of the main tree's root.

   (b) a root unconnected to the main tree's root.

   (c) **fewer nodes than the main tree.**

   (d) a sibling with the same number of nodes.

3. Finding a node in a binary search tree involves going from node to node, asking

   (a) **how big the node's key is in relation to the search key.**

   (b) how big the node's key is compared to its right or left children.

   (c) what leaf node we want to reach.

   (d) what level we are on.

4. An unbalanced tree is

(a) in which most of the keys have values greater than the average.

(b) whose behavior is unpredictable.

(c) **in which the root or some other node has many more left children than right children, or vice versa**.

(d) that is shaped like an umbrella.

5. In a binary tree used to represent a mathematical expression, which of the following is not true?

(a) **Both children of an operator node must be operands.**

(b) Following a postorder traversal, no parentheses need to be added.

(c) Following an inorder traversal, parentheses must be added.

(d) In pre-order traversal a node is visited before either of its children.

6. Fill in the blanks

(a) Inserting a node starts with the same steps as **finding** a node.

(b) Suppose a node A has a successor node S. Then S must have a key that is larger than **A** but smaller than or equal to **its parents node.**

(c) If a tree is represented by an array, the right child of a node at index n has an index of **2*n+1**.

(d) The number of edges from the root to the node is called **depth** of the tree.

7. State whether the following statements are TRUE or FALSE. Justify your answer.

(a) Deleting a node with one child from a binary search tree involves finding that node's successor. (False)

(b) Not all trees are binary trees. (True)

(c) In Binary Search Tree the left and right sub-trees should also be binary search trees. (True)

8. What does the following piece of code do?

```
public void func(Tree root)
```

```
{ func(root.left());
  func(root.right());
  System.out.println(root.data());
}
```

(a) Preorder traversal

(b) Inorder traversal

(c) **Postorder traversal**

(d) Level order traversal

9. The preorder traversal sequence of a binary search tree is 30, 20, 10, 15, 25, 23, 39, 35, 42. Which one of the following is the postorder traversal sequence of the same tree?

(a) 10, 20, 15, 23, 25, 35, 42, 39, 30

(b) 15, 10, 25, 23, 20, 42, 35, 39, 30

(c) 15, 20, 10, 23, 25, 42, 35, 39, 30

(d) **15, 10, 23, 25, 20, 35, 42, 39, 30**

10. Postfix expression for (A+B) * (C+D) is

(a) A B C * + D +

(b) **A B + C D + ***

(c) ABCD++*

(d) None

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