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Week 6 Quiz

The due date for submitting this assignment has passed.

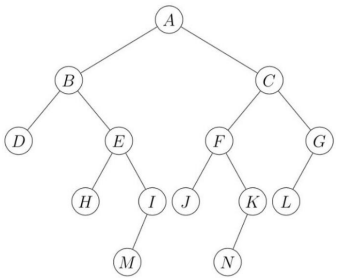
Due on 2021-10-06, 23:59 IST.

Score: 8/10=80%

Assignment submitted on 2021-10-06, 13:44 IST

All questions carry equal weightage. You may submit as many times as you like within the deadline. Your final submission will be graded.

1) Suppose that the following is a binary search tree. The letters indicate the names of the nodes, not the values that are stored. ***2 points***



What is the successor node, in terms of value, of the node B?

- A
- E
- H
- M

Yes, the answer is correct.
Score: 2

Feedback:

The leftmost node in the right subtree of B.

Accepted Answers:
H

2) We have n distinct values stored in a binary search tree. Define the height of a tree to be the number of nodes in the longest path from root to leaf. Which of the following statements is **not** true? ***2 points***

- If the root is the median value, the height of the tree is at most n/2.
- If the root is the median value, the height of the tree is at most log n.
- The height of the tree is at least log n.
- The height of the tree is at most n.

Yes, the answer is correct.
Score: 2

Feedback:
An upper bound of log n on the height requires the tree to be balanced.

Accepted Answers:
If the root is the median value, the height of the tree is at most log n.

3) Suppose we have some values stored in a binary search tree of height n. Which of the following statements is true? ***2 points***

- The number of elements in the tree is at most n.
- The number of elements in the tree is at least n.
- The number of elements in the tree is at least 2^n.
- The number of elements in the tree is at most n log n.

No, the answer is incorrect.
Score: 0

Feedback:
With n levels, there must be at least n elements in the tree. All other answers depend on the shape of the tree, whether it is balanced etc.

Accepted Answers:
The number of elements in the tree is at least n.

4) Preorder traversal prints a tree by first listing the value at the root and then recursively listing the values of the left and right subtrees. ***2 points***

```
function preOrder(t) {
  if (t != NIL) {
    print(t.value);
    preOrder(t.left);
    preOrder(t.right);

  }
}
```

What is the complexity of preorder traversal for a binary search tree with n nodes?

- O(log n) if the tree is balanced, $O(n^2)$ otherwise.

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- O(n) if the tree is balanced, O(n log n) otherwise.
- O(n log n) whether the tree is balanced or unbalanced.
- O(n) whether the tree is balanced or unbalanced.

Yes, the answer is correct.
Score: 2

Feedback:
Preorder traversal visits and lists each element once, so it is O(n).

Accepted Answers:
O(n) whether the tree is balanced or unbalanced.

5) The preorder traversal of a binary search tree with integer values produces the following sequence: 35, 23, 26, 46, 40, 39, 41. What is the value of the right child of the root of the tree? ***2 points***

- 23
- 39
- 40
- 46

Yes, the answer is correct.
Score: 2

Feedback:
The inorder traversal of a search tree is always the sorted sequence. In this case: 23, 26, 35, 39, 40, 41, 46. From the preorder traversal, we know that 35 is the root of the tree, so the segment 23, 26 corresponds to the left subtree and the segment 39, 40, 41, 46 corresponds to the right subtree. The preorder traversal of the right subtree starts with 46, so this is the right child of the root node.

Accepted Answers:
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