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1. Choose the appropriate running time from the list below.

The variable n represents the number of items (keys, data, or key/data pairs) in the structure. In answering this question you should assume the best possible implementation given the constraints, and also assume that every array is sufficiently large to handle all items (unless otherwise stated).

Worst case for finding a key in a Binary Search Tree (not necessarily AVL).

A. [Correct Answer] [Your Answer] $O(n)$
B. $O(1)$
C. $O(n^2)$
D. $O(\log n)$
E. $O(n \log n)$

2. Choose the appropriate running time from the list below.

The variable n represents the number of items (keys, data, or key/data pairs) in the structure. In answering this question you should assume the best possible implementation given the constraints, and also assume that every array is sufficiently large to handle all items (unless otherwise stated).

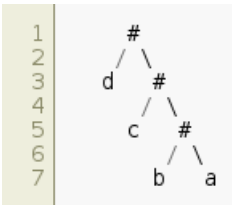
Determine if a Binary Tree is a Binary Search Tree

A. $O(n \log n)$
B. $O(\log n)$
C. $O(1)$
D. $O(n^2)$
E. [Correct Answer] [Your Answer] $O(n)$

3. Which of the following **CANNOT** be a valid sequence of nodes from the root to a leaf of a `binary search tree`?

A. `492, 125, 418, 197, 223`
B. `128, 735, 209, 245, 223`
C. [Correct Answer] [Your Answer] `121, 9, 107, 4, 100`
D. `254, 103, 199, 154, 190`
E. None of the options is correct.

4. Given the following Huffman code: `0101101010111`, and the following Huffman tree:



What is the coded message (notice that the tree branches have not been denoted as `0` or `1`)?

A. `c c d c c c d d` or `c d b c c d`
B. `c d b c c d`
C. `d c b c c a`
D. `c d b c c d` or `d c b c c a`
E. [Correct Answer] [Your Answer] `d c b c c a` or `c c d c c c d d`
F. `c c d c c c d d`

5. Consider the Binary Search Tree built by inserting the following sequence of integers, one at a time, in the given order.

```
5, 4, 7, 9, 8, 3, 1
```

What is the **height** of the tree produced?

A. `5`
B. We do not have enough information to answer the question.
C. `4`
D. `2`
E. [Correct Answer] [Your Answer] `3`