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 time to find the In Order Predecessor of a given key in a Binary Search Tree (if it exists).

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

---

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

```
6, 2, 1, 3, 9, 10, 8
```

How many nodes have **two non-NULL** children in the tree produced?

    A. 2
    B. We do not have enough information to answer the question.
    C. 4
    D. 1
    E. [Correct Answer] [Your Answer] 3

---

3. 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).

Insert a key into a Binary Search Tree (not necessarily AVL)

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

---

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

---

5. Given the following string of characters:

```
a b a a c c d e f f e a a d c e c
```

which character will possibly have the Huffman code `00`?

    A. f
    B. [Correct Answer] a
    C. b
    D. [Your Answer] d
    E. None of these options can possibly have a Huffman code `00`