Data Structures Quiz 1

Please go through the instructions before attempting the quiz:

1. Once you start attempting, you should complete the quiz in thirty minutes.
2. You should attempt the quiz on your own without the help of anyone else or referring to any material.
3. If it is learnt that you violated either of the above, you will be awarded an FR for the course.
4. You must submit your answers by 17:00 on 23 October 2020. Any submissions beyond this time will be disregarded.
5. There is no negative marking.

The respondent's email address (**subruk@cse.iith.ac.in**) was recorded on submission of this form.

In a sorted array of n elements, what is the smallest worst case bound for running time of search and insert respectively?

- ○ O(log n), O(log n)
- ◉ O(log n), O(n)
- ○ O(n), O(log n)
- ○ O(n), O(n)

Suppose we have a binary search tree of the elements {1, 2, 3, ..., 100} such that its height is 60, which of the following CANNOT be the root?

- ○ 25
- ○ 36
- ◉ 49
- ○ 64

What is the maximum number of pointer changes required for a single rotation in a BST (with both parent and child pointers)?

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If T is a red black tree with black height 3, what is the minimum and maximum number of elements (not counting null nodes) that it can contain (respectively)?

- ○ 4, 8
- ○ 7, 21
- ○ 8, 16
- ◉ 7, 63

Suppose we have a data structure called Binary Anti-Search Tree (BAST). In a BAST, for every node, the left subtree contains values bigger than the key in that node, and the right subtree contains values smaller (assume no duplicates). What is the smallest worst case bound for search time in a BAST of n elements?

- ○ O(1)
- ○ O(log n)
- ○ O(sqrt n)
- ◉ O(n)

Suppose x is a node in a BST. Which of the following CANNOT be true?

- ○ The successor of x is a child of x.
- ○ The successor of x is the root.
- ◉ The successor of x is the nephew of x (child of the sibling of x).
- ○ The successor of x does not exist.