26/07/2024

Lab 7 DSA Refresher Module

Duration: 04:00 pm to 05:10 pm.

After 5:10 pm, no submissions allowed.

MM:10

Problem Title:

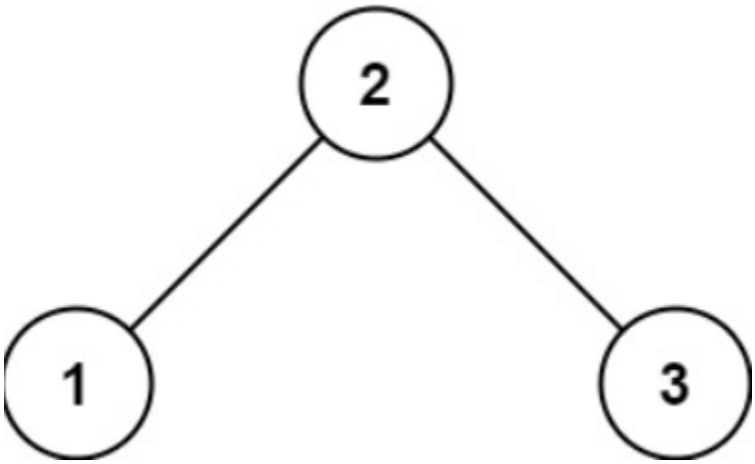
In the kingdom of DataLand, there was a wise tree named Sage, known for keeping order in the information forest. One day, a new tree sprouted, and the citizens wondered if it was a true Binary Search Tree (BST).

To be a valid BST, Sage explained, every node must follow two rules:

1. The left subtree contains only nodes with keys less than the node's key.
2. The right subtree contains only nodes with keys greater than the node's key.

Both subtrees must also be valid BSTs. The citizens set out to check the new tree, starting from the root and ensuring every node followed these rules. By doing so, they could ensure the new tree would help maintain the kingdom's perfect order.

Testcases:



Input: root = [2,1,3] ; Output: true

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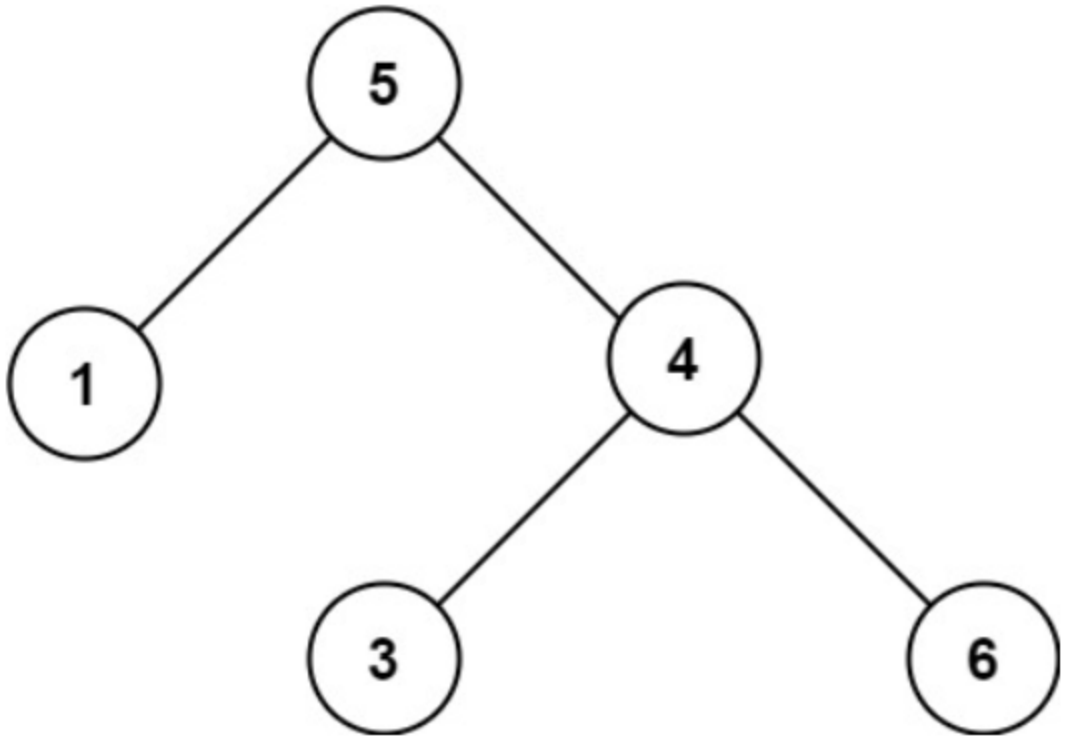

Input: root = [5,1,4,null,null,3,6] ; Output: false
Explanation: The root node's value is 5 but its right child's value is 4.

Write a function for the above problem along with the time complexity and space complexity.
(TC and SC should be written in comments.)