CL2001 – Data Structure Lab

Exercise # 11

Note:

- Copied task will be awarded **zero** marks.
- Use comments wherever applicable.
- Note that these lab task marks could be graded through a viva in lab.
- Variables and functions names should be meaningful.

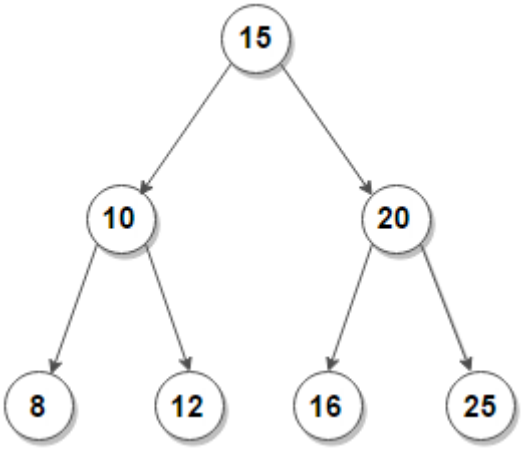
Problem: 1 | Delete Node in BST

Write a function to delete a specific node in BST.

Problem: 2 | k'th smallest node in a BST

Given a BST and a positive number k, find the k'th smallest node in it.

For example, the 2nd smallest node in the following BST is 10, the 4th smallest node in the following BST is 15, and the 6th smallest is 20. The 8th smallest node does not exist.



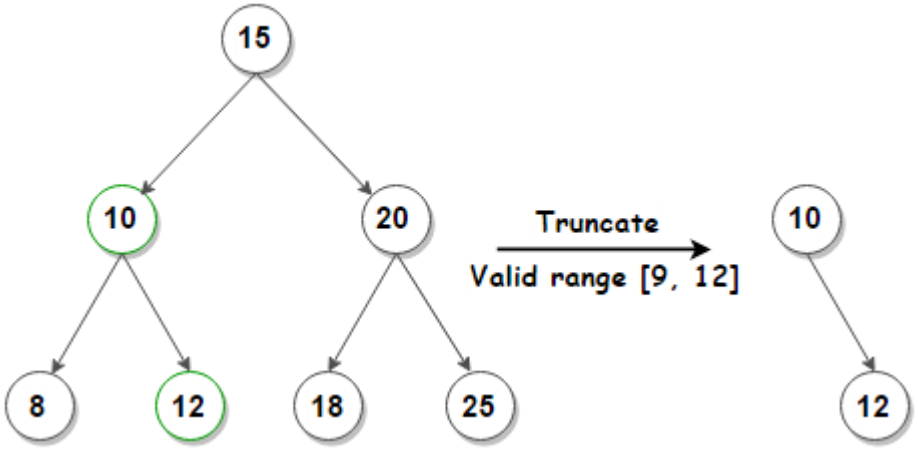
Hint:

The idea is to traverse the BST in an inorder fashion since the inorder traversal visits the nodes of a BST in the sorted order. Maintain a counter along with recursion that keeps track of the visited nodes, and when that counter reaches k, return that node.

Problem: 3 | Remove nodes from a BST that have keys outside a valid range

Given a BST and a valid range of keys, remove nodes from the BST that have keys outside the valid range.

For example, consider BST shown on the left below. It should be truncated to BST shown on the right.



Hint:

Traverse the tree in a bottom-up fashion (*post order traversal*) and truncate the left and right subtree before processing a node.

For each node, check

- If its key falls within the valid range, nothing needs to be done.
- If the root's key is smaller than the minimum allowed, remove it and set the root to its right child.
- If the root's key is larger than the maximum allowed, remove it and set the root to its left child.