Binary Search Tree Task Descriptions

Binary-Search-Tree-Definition:

- A Binary-Search-Trees Node has at most two children.
- The left child and all its descendants have lower values compared to the parent's value.
- The right child and all its descendants have higher or equal values than the parent's value.

Binary-Search-Tree-Tasks

1. Binary Search Tree Insertion

The student solving the task is asked to insert the provided values into a given Binary Search Tree. If none is provided, then the values must be inserted into an initially empty Binary Search Tree. The values must be inserted in the given order while following the rules of a Binary Search Tree until the created Binary Search Tree includes all values.

2. Binary Search Tree Deletion

The student solving the task is asked to remove the provided values from a given Binary Search Tree. The provided values must be removed from the existing Binary Search Tree one after another in the given order until all values are successfully removed.

When removing a node from the tree, different cases must be considered to maintain the Binary Search Tree structure. If the node to be removed is a leaf (has no children), it is simply deleted. If the node has only one child, the child takes its place in the tree, and the subtrees of the child are not altered.

If the node to be removed has two children, a specific restructuring occurs to preserve the order of elements in the tree. In this case, one must locate the node to be deleted and find the minimum value in its right subtree (i.e., go right first and then go left until you arrive at a leaf). Then the minimum node is removed from the right subtree and takes the place of the deleted node. Then the remainder of the right subtree is added as the right child of the minimum node. This way, the hierarchical order of the tree is maintained, ensuring that all nodes in the left subtree remain smaller than the new parent and all nodes in the right subtree remain larger than the new parent. This process does not cause any violation of the binary search tree rules.