CSCI 433/502 Algorithms
Self Test Binary Tree Algorithms

You should be familiar with standard binary tree traversals, for example, Preorder:

**Algorithm 1** Standard Preorder traversal

1: function PreOrder($T$): void
2: if $T \neq$ null then
3:   Visit node
4:   PreOrder($T_{Left}$)
5:   PreOrder($T_{Right}$)
6: end if
7: end function

Write recursive pseudocode algorithms to solve each of the following problems on a binary tree:

1. Count the number of leaves.
2. Sum the content of the elements at the nodes.
3. Find the height of the tree (length of the longest path from root to a leaf), where the path length is the number of edges.
4. Count the number of occurrences of the item $k$ in the tree. Alternative: return true if item $k$ is in tree or false otherwise.
5. Consider the tree to be a binary search tree. Search for the item $k$. Return true if it is found; false, otherwise.
6. Insert a value $k$ into a binary search tree