Assignment 8 Time Efficiency Analysis

Case 1: Tree is balanced

In the “add” method, the getLevel method is called every time in the “else if” condition statements except the last “else if”, which getLevel is of O(n). If the tree is balanced, then the average and worst cases the recursive add method will run O(logn) and go through logn number of nodes. If we ignore the getLevel method in the “else if” conditions, then the average and worst cases of “add” method is O(logn). If we include the getLevel, then average and worst cases of the “add” method is O(nlogn).

The “contains” method is similar to the “add” method, the while loop will run logn times. If we ignore the getLevel method in the “else if” conditions, then the average and worst cases of “contains” method is O(logn). If we include the getLevel, then average and worst cases of the “contains” method is O(nlogn).

Case 2: Tree is not balanced

If not including the getLevel method, both “add” and “contains” methods is O(logn) in average case. If including getLevel method, then it is O(nlogn). In the worst case where the nodes are linear, then the “add” and “contains” method is O(n) if not including getLevel and they are O(nn) if including getLevel.