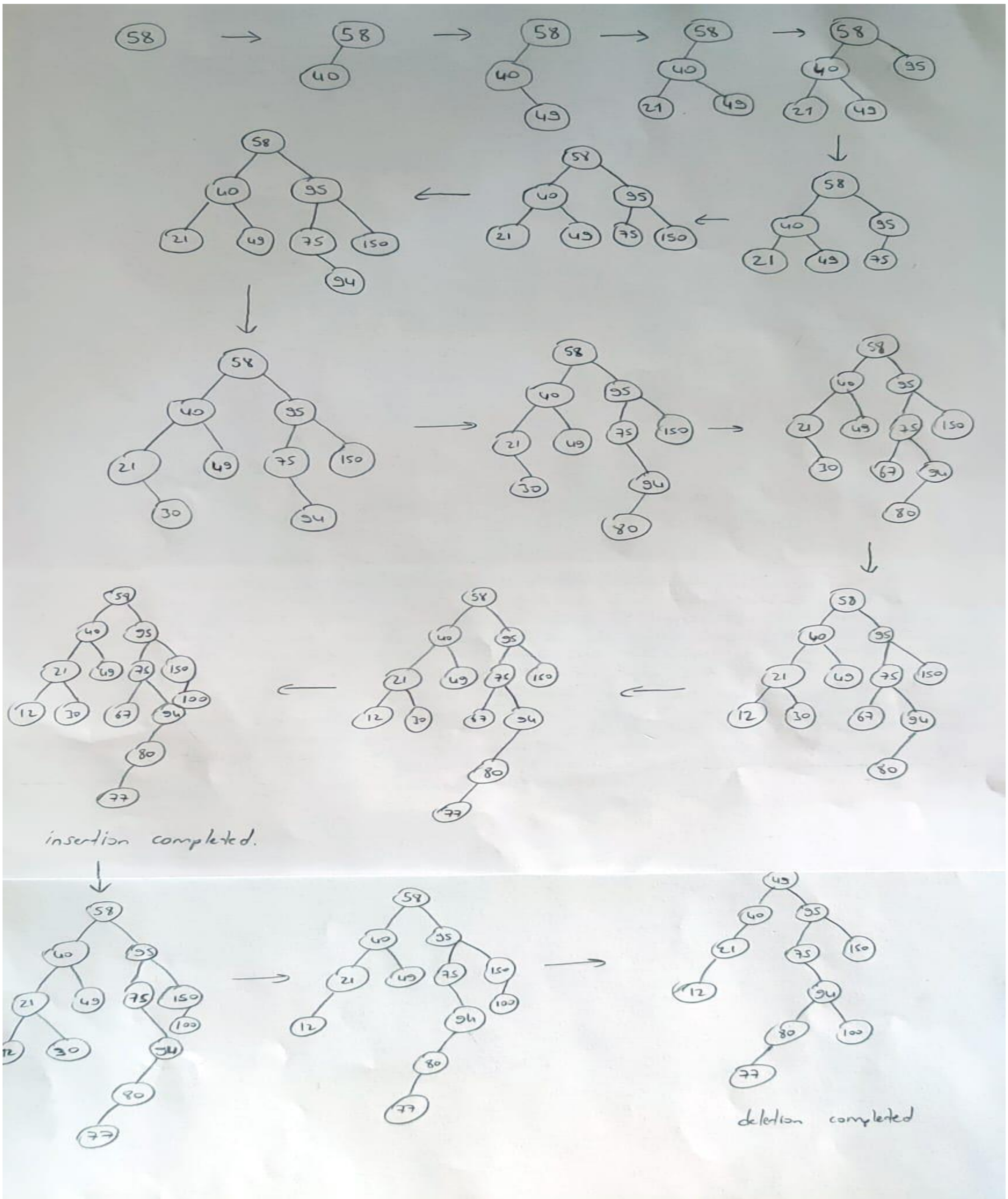
Question 1

Preorder: -**AB-+CDE/F+GH

Inorder: A*B*C+D-E-F/G+H

Postorder: AB*CD+E-*FGH+/-

Question 2



Question 4

Worst-case running time complexities of the addNgram;

The addNgram method first uses the findNode method to see if the Ngram exists in the tree, which then traverses the tree. If Ngram is found, it increments the count. If not found, it calls the insertInorder method, which traverses the tree until it finds the appropriate location and adds the node to the appropriate location.

FindNode, searching in the tree, worst case O(n).

insertInorder, inserting in right place of the tree, worst case O(n).

Thus, the worst case of addNgram is n + n = 2n => O(n).

Worst-case running time complexities of the operator<<;

In the operator<< method, inorder is traversed to print the whole tree alphabetically, which traverses the entire tree visiting the leftmost node, root node, and right node. In this case, the worst case algorithm is O(n) since the traversing process is node-independent and constant depending on n.

inorder, traverse the tree inorderly, worst case O(n).

Thus, the worst case of operator<< is O(n).