

HW-5: CSC241 (Data Structure and Algorithm)

Due Date: 05/01/2023 (11.59:59 PM)

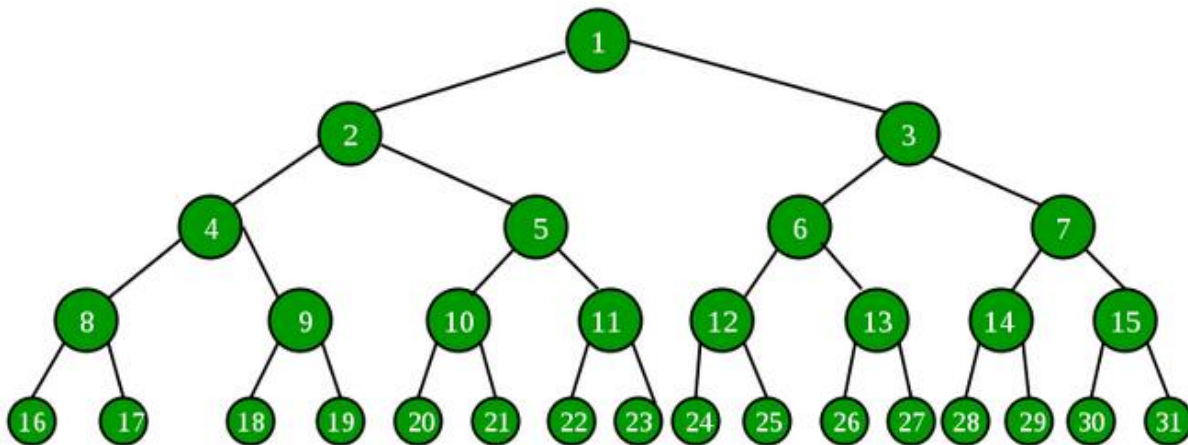
Special Instruction: Your HW will be graded based on correctness and clarity. Keep your answer precise and to the point. If any question asks for justification of your answer/claim, you may receive a 0 if you merely provide an answer without justification. All sub-questions carry equal weights unless specified otherwise. Finally, please check the HW rules at the end.

Rules for HW: You can discuss the problem sets and study together in group, but when it comes to formulating/writing solutions you must work alone independently; i.e., you should be able to explain your answer clearly to anyone else (including the TA and the instructor). Note that this says discuss in group — copying homework solutions from another student, from the Internet, solution sets of friends who have taken this course or one similar to it previously, or other sources will be considered **cheating** and referred to the university. At the beginning of each submission, you should explicitly list the people you worked with.

What to do: Reach to me ASAP if you have any confusion and/or have any emergency that may deter you to submit HW on time. Never hesitate to ask me if any of the previously discussed topics is unclear and you need some more discussion.

Question 1 (34 Points): Consider the tree given below and perform the following traversal, and print the nodes accordingly.

- I. **Inorder(1)** /* do the in-order traversal from 1*/
- II. **preorder(1)** /* do the pre-order traversal from 1*/
- III. **postorder(1)** /* do the post-order traversal from 1*/



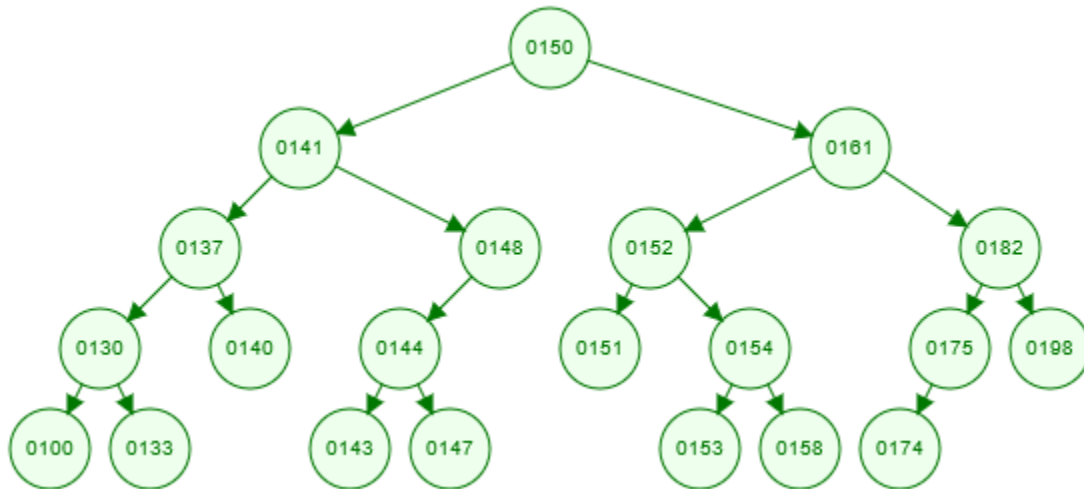
Question 2 (33 Points): Consider the following equation:

$$y + \left\{ \frac{(x + y) * z}{(y * z) - x} + \frac{(x * x) + (y * z) - x}{x + y + z} \right\}$$

Now do the following:

- I. Convert it to a binary expression tree.
- II. Do preorder traversal of this tree
- III. Do post-order traversal of this tree

Question 3 (23 Points): Consider the following binary search tree (BST). Now, delete node 161, 150, 137 and 141. Then redraw the BST at each step.



Question 4 (10 Points): You have a binary tree and a BST; both contain N nodes. If you search for a random node from these trees, in the worst case, how many iterations will be needed for the

- (i) binary tree? Justify your answer
- (ii) BST? Justify your answer