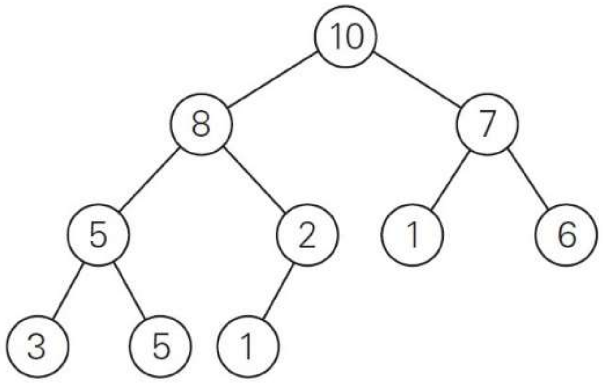
CS/CPE590: Algorithms
Spring 2023
Assignment3

Search Trees

1. (50 Points) Implement a C++ class for the binary search tree (BST) and do the inorder traversal (after inserting the elements of an array into the BST) to print the elements of the array in the sorted order. Follow the provided template.

2. (25 Points) Consider the following binary tree:



(a) Traverse the tree using preorder, inorder, and postorder traversal and mention the output sequence in each of the cases.
(b) How many internal nodes are there? What is the size and height of the tree?
(c) What is the maximum width and diameter of the tree?
(d) Is this a BST? Explain your answer.

3. (25 points) Draw the 2-3 tree after inserting each of the keys: 50, 76, 23, 21, 20, 19 (redraw the whole tree for each of the cases). Now, delete key 21 from the tree and redraw the tree. Then, insert key 21 and redraw the tree.

Remarks:

- The assignment has to be completed individually. No collaboration is allowed between students. No code from online resources is allowed to be used. Any sign of collaboration or use of online materials will result in a 0 and be reported to the Graduate Academic Integrity Board. You have to strictly follow the provided template. The late submission policy is applicable to the assignment as specified in the course syllabus.

- You have to submit a report containing your solutions to problems 2 and 3 as a pdf file.
- For problem-1, you have to maintain the provided template strictly!
- You have to make sure your program works as expected in the following online compiler: https://www.onlinegdb.com/online_c++_compiler.
- **Submit a zip file containing your report(.pdf) file and code(.cpp) file**.