Sheet 3
BST - AVL

1 Question 1

For the numbers [80, 20, 100, 10, 40, 90, 30, 50, 35], show the result and the intermediate steps for each of the following.

a) Build a BST.

b) Give the pre-order, in, and post order traversal of the tree.

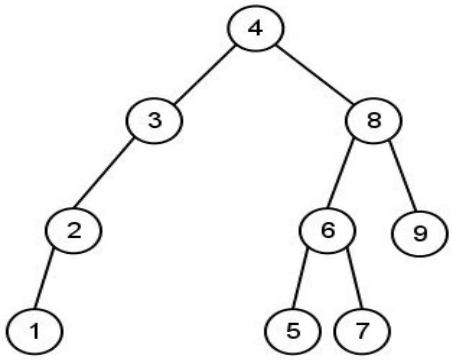
c) Redraw the above BST after 95 is added and 20 is deleted.

d) Redraw the above BST after 39 is added and 40 is deleted.

e) Is the above BST balanced? If not, redraw it after rebalancing.

2 Question 2

Consider the following tree:



a) What is the pre-order traversal of the tree?
b) What is the in-order traversal of the tree?
c) What is the post-order traversal of the tree?
d) Identify if it is a tree, binary tree, BST, AVL tree. Explain why/why not in each case.
e) Based on your previous answer, draw the tree obtained by inserting 10 into the tree. (Show the steps)
f) Draw the tree obtained by deleting 2 from the tree. (Show the steps)
g) Draw both trees that might be obtained by deleting 4 from the tree while still maintaining the properties in your answer to (e)

3 Question 3

a) Draw an AVL tree after inserting [17, 8, 5, 7, 4, 6, 15, 2, 0, 3] in order. Show intermediate steps after each insertion, clearly label each step.

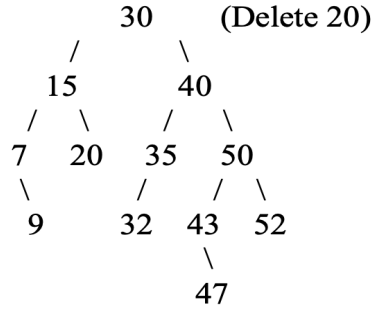
b) Derive a precise expression for the minimum and maximum number of nodes in an AVL tree of height h.

c) Derive a precise expression for the minimum and maximum height of an AVL tree with n nodes.

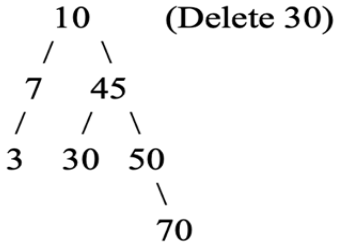
4 Question 4

Draw the tree after deleting values from each of the following AVL trees and show the balancing operations.

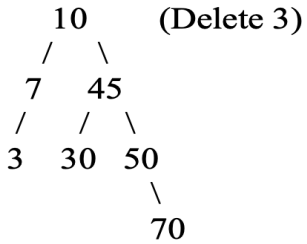
a)



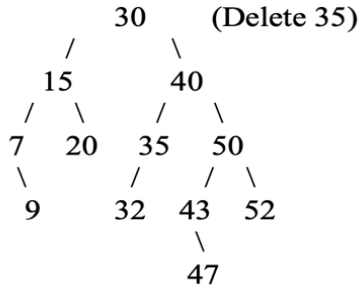
b)



c)



d)



5 Notes

- You are required to submit a PDF of your answers and your ID in teams before 11:59 AM.
- You are encouraged to ask any questions on teams, or in person.

Good Luck