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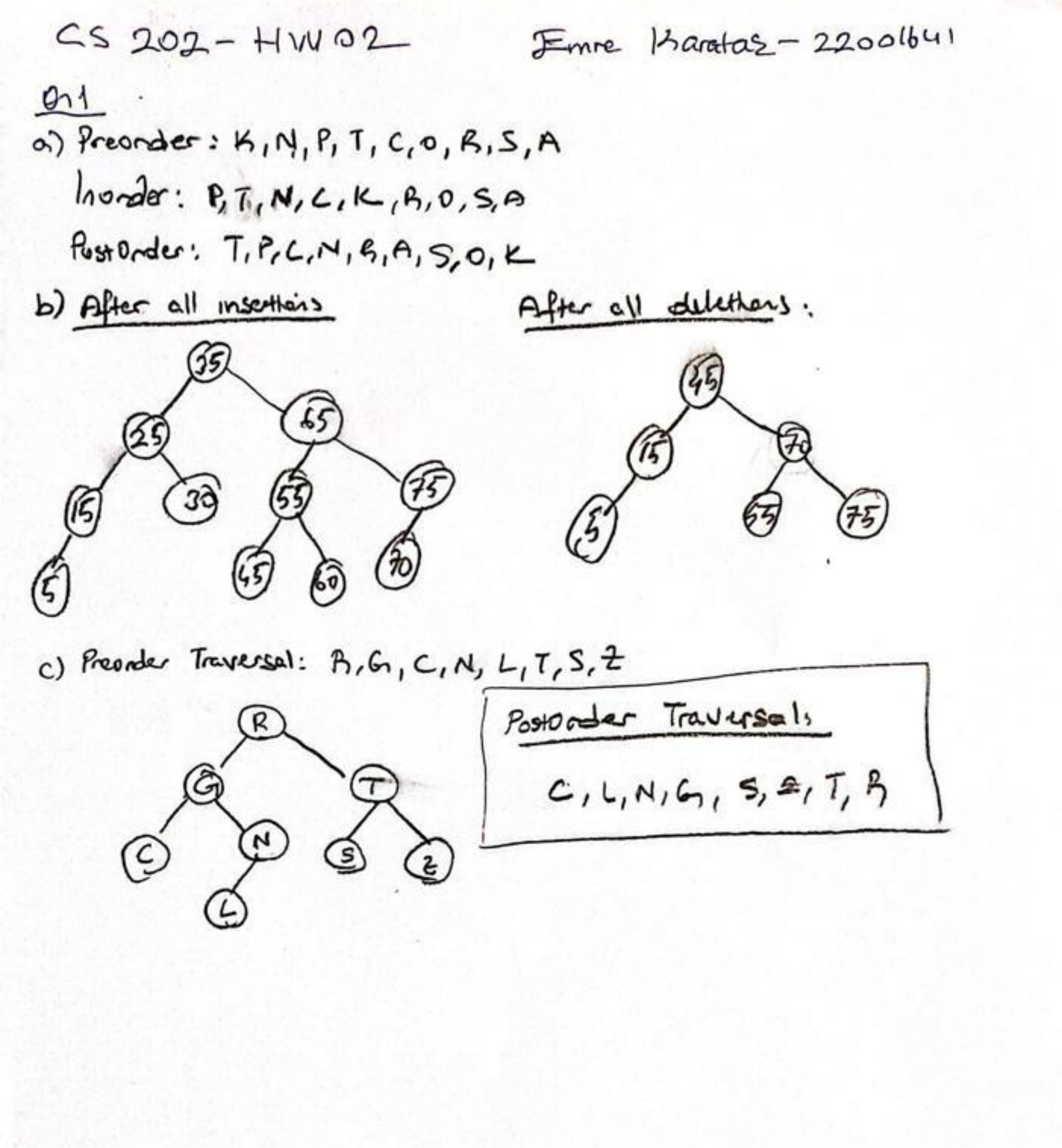
CS 202-01

CS 202

HOMEWORK 02

QUESTION #1:



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Q1

a) Preorder: K, N, P, T, C, O, R, S, A

Inorder: P, T, N, C, K, R, O, S, A

PostOrder: T, P, C, N, R, A, S, O, K

b) After all insertions   After all deletions:

35
25
65
15
30
55
75
5
45
60
70
45
15
70
5
55
75

c) Preorder Traversal: R, G, C, N, L, T, S, Z

R
G
T
C
N
S
Z
L

Postorder Traversals

C, L, N, G, S, Z, T, R

QUESTION 3:

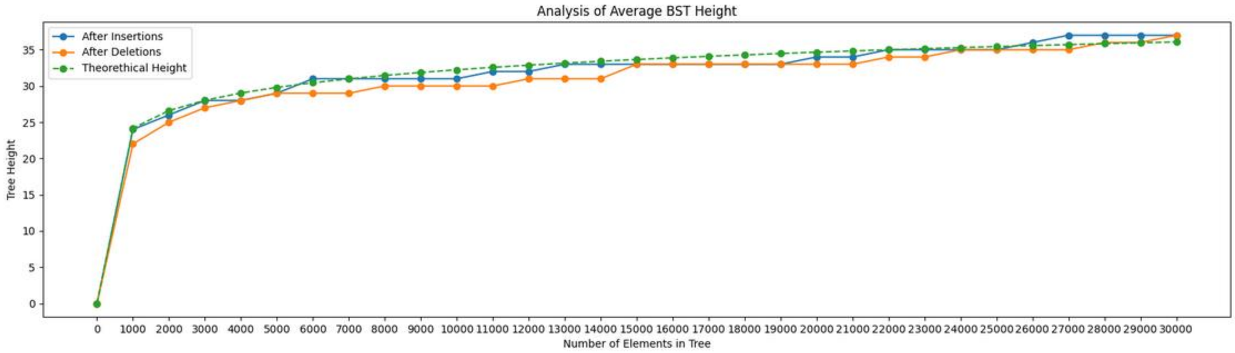

Fig. 1: BST Height Averages, obtained from Jupyter Notebook.

- Theoritical value of a tree composed of n nodes have average of log(n) height. Notice that we use recursive method for height calculation of tree, divides tree 2 different subtrees (left and right) and calculate them again recursively. From the graph it can be observed that the values obtained from 30000 size array insertion and deletion confirms theroticial results. Notice that there can be some fluctations between therotical and experiment values, due to randomly generated array (which creates best case for BST height) .
- In a different situation, if the array created was a sorted array. For this situation, there are 2 possibilites which concludes n height from n nodes:
  Array in Descending Order: Root's left subtree's left children are fulfilled with the values repeatedly. So, there will be a long chain tree moving to left. Height is in worst case, if there are n nodes, height will be n.
  Array in Ascending Order: Root's right subtree's right children are fulfilled with the values repeatedly. So, there will be a long chain tree moving to right Height is in worst case, if there are n nodes, height will be n.