CSN-261: Data Structures Laboratory

Lab Assignment 8 (L8)

Instruction: Use Java for solving the assignment.

Q1. Given an integer n and a sequence of n distinct numbers a1 , a2 , ..., an, find the order in which these integers must be inserted to an empty binary search tree T (no rotation allowed) such that at each insertion, T is an AVL tree i.e., for all nodes of binary search tree T, |Height of left subtree – Height of right subtree| <= 1

Input Format: Single integer n which is the number of elements in the sequence followed by n distinct integers a1 , a2 , ..., an,

Output Format: Print n space separated integers showing the required sequence

Test Cases

```
Input 1:
5
5 4 3 2 1

Output 1:
3 1 4 2 5

Input 2:
10
7 4 1 0 2 5 8 9 6 3

Output 2:
4 1 7 0 2 5 8 3 6 9
```

Q2. Given an adjacency matrix representation of a Directed Acyclic Graph (DAG), perform the topological sorting of its vertices. Topological sort is a linear ordering of vertices such that for every directed edge *(u, v)* from vertex *u* to vertex *v*, *u* comes before *v* in the ordering

Input Format: Single integer n which is the number of vertices in the graph. Followed by n rows, each with n integers (0/1: Absence/Presence of a directed edge)

Output Format: Print n space separated integers showing the topologically sorted vertices.

```
Input 1:
6
0       0       0       0       0       0
0       0       0       0       0       0
0       0       0       1       0       0
0       1       0       0       0       0
1       1       0       0       0       0
1       0       1       0       0       0

Output 1:
5 4 2 3 1 0
OR
4 5 2 3 1 0
```

Equivalent Adjacency Matrix Representation

V	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	1	0	0
3	0	1	0	0	0	0
4	1	1	0	0	0	0
5	1	0	1	0	0	0