Graded Lab Assignment 2

For this graded lab assignment, you will write programs in C, **making use of Data Structures Concept.**

Instructions

- There are 2 questions in this assignment.
- **Assignment submitted after due date and time will not be evaluated.**
- Submit the document (pdf or .doc file) on blackboard.
- Any discussion with any other student will result in 0 points in this graded lab.
- Handout given to you is self-explanatory. DO NOT ask any query from other students.

Due Date: Midnight, April 12, 2020

Grading Criteria

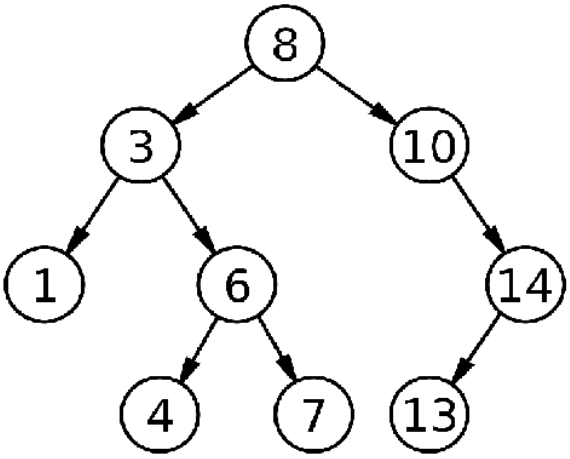
Correct answers (both in terms of logic and output) will be awarded full points. **This assignment has 6 points (with weightage of 6% in your overall 100 points).**

Programming Questions

Ques. 1 Yatin is playing PUBG and he has reached a place with a large staircase in front of him. And there is an enemy at each landing of the staircase. **(4 Marks)**

This is not the actual staircase. He is looking at the staircase from sideways.

The staircase is analogous to a binary tree with each of its nodes as a landing of the staircase and each of its edges as stairs from one landing to another.



Yatin wants to kill the maximum possible number of enemies. He can kill every person he can see from his position with his suppressed sniper gun. But he can see only the persons at the leftmost standing at each level and cannot see the rest.

Before starting shooting them, he wants to know how many persons he can kill. He is busy keeping an eye on the enemies. So he wants you to find out the maximum number of people he can kill from that location by providing you with the analogous a binary search tree.

[Note: Players do not change their position after one player has died, i.e. the leftmost node remains the same even after player on that node has died. Or we can say that the nodes are not removed after the player on that node has died.]

Input

The first line of input contains a number t denoting the number of test cases.

The first line of each test case contains n, the number of nodes in the tree.

The second line of each test case contains n space separated integers (unique) a_i denoting the value at each node of the BST.

Output

Print the answer for each test case on a new line.

Constraints

$1 <= t <= 20$
$1 <= n <= 1000$
$1 <= a_i <= 1000000000$

Sample Input	Sample Output
1	4 8, 3, 1 and 4
9	
8 3 10 1 6 14 4 7 13	

Ques. 2 Once Monk was watching a fight between an array and a tree, of being better. Tree got frustrated and converted that array into a Binary Search Tree by inserting the elements as nodes in BST, processing elements in the given order in the array. Now Monk wants to know the height of the created Binary Search Tree. **(2 Marks)**

Help Monk for the same.

Note:

1) In Binary Search Tree, the left sub-tree contains only nodes with values less than or equal to the parent node; the right sub-tree contains only nodes with values greater than the parent node.

2) Binary Search Tree with one node, has height equal to 1.

Input Format :

The first line will consist of 1 integer *N*, denoting the number of elements in the array.
In next line, there will be *N* space separated integers, A[i] where $1 \leq i \leq N$, denoting the elements of array.

Output Format

Print the height of the created Binary Search Tree.

Constraints: :

$1 \leq N \leq 10^3$
$1 \leq A[i] \leq 10^6$

Sample Input	Sample Output
4	3
2 1 3 4	

Explanation

N = 4.

Insert 2. It becomes root of the tree.
Insert 1. It becomes left child of 2
Insert 3. It becomes right child of 2
Insert 4. It becomes right child of 3.
Final height of tree = *3*.