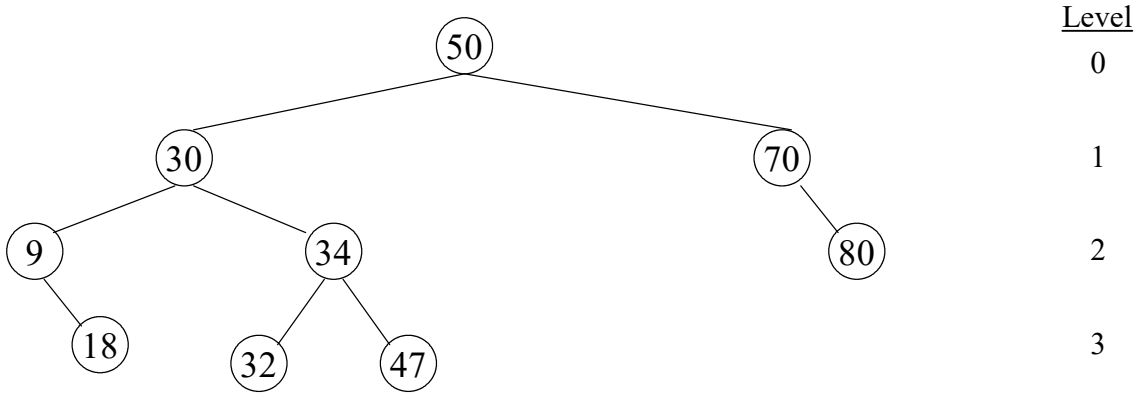
Problem 7 – BST Height

Trees are particularly annoying to Professor Plum. He likes to fly kites in the center of campus, but the wind keeps blowing his kites into the trees. Professor Plum has spent enough time observing trees to notice that some are taller than others.

Professor Plum often teaches Data Structures so he knows that the same thing can happen in binary search trees (BSTs). Recall that for each node in a Binary Search Tree (BST) all values in the left-subtree are < the root node and all values in the right-subtree are > the root node. The shape of a BST depends on the order in which values are added. For example, if we start with an empty BST and insert the sequence of values: 50, 70, 30, 80, 34, 32, 9, 47, 18, then we get the BST:



He wants you to write a program to determine the height of the BST given a sequence of inserted values. The height of the BST is defined to be the maximum level of the tree. For the above input sequence, the program should report a BST height of 3.

Input

The first line contains the number of BSTs. Each of the following lines contain the information about a BST. A BST line starts with the number values to be inserted into the BST followed by a sequence of integers to insert. For example, the first BST in the example input below matches the above BST.

```
3
9 50 70 30 80 34 32 9 47 18
5 2 4 6 8 10
12 4 50 30 20 10 70 65 8 90 100 130 120
```

Output

For each BST, print to standard output a case label and the height of the BST. For the example input given above, the output is:

```
Case 1: 3
Case 2: 4
Case 3: 6
```