

ASTU ICPC CLUB

Size of subtrees

Time limit: 2 sec.

Memory limit: 64MB

Description

DFS(Depth First Search) is a one of the ways to search(or traverse) a tree or a graph structure. Despite its simplicity, DFS is a very powerful algorithm, and can be used in various situations.

(Above paragraph is shared with many problems)

In a rooted tree with root node r , the subtree from node v consists of descendants of v . In other words, for every node u in the subtree from node v , v must be in the path from u to r . Let's consider the following example.

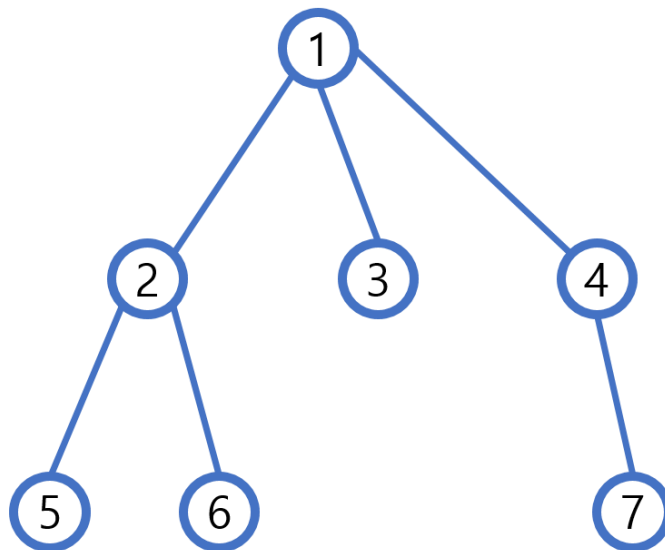


Figure 1) A rooted tree with 6 nodes.

Figure 1 shows a rooted tree with 6 nodes, with node 1 as the root. The subtree from node 2 consists of node 2, 5, 6 (Red triangle in Figure 2) and the subtree from node 7 consists of only node 7 itself (Green triangle in Figure 2). The subtree from node 1, the root node, consists of the whole tree (Purple triangle in Figure 2)!

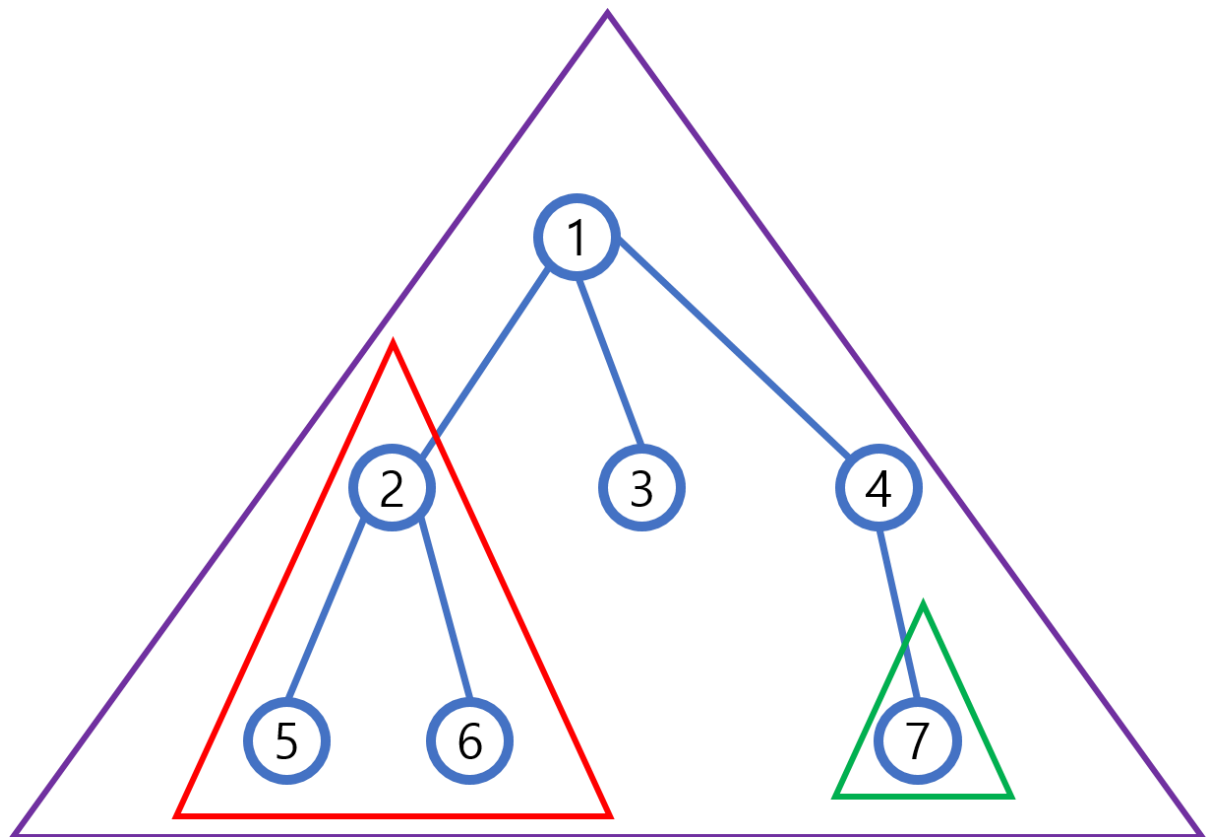


Figure 2) Some subtrees of Figure 1

A size of a tree is defined as the number of nodes in the tree. For example, the tree in Figure 1 has size of 7.

You will be given a rooted tree with n nodes and $n-1$ edges. The nodes are numbered from 1 to n , and node 1 is the root. Print the size of all the subtrees.

Input

The first line of the input contains integers n , the number of nodes. ($1 \leq n \leq 100000$)

The i -th line of the next $n-1$ line of the input contains integers p_{i+1} , the parent node of node $i+1$. ($1 \leq p_{i+1} \leq i$)

Output

The output should consist of n lines. In the i -th line of the output, print a single integer s_i , the size of the subtree from node i .

Sample I/O

Input(s)	Output(s)
7	7
1	3
1	1
1	2
2	1
2	1
4	1