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.

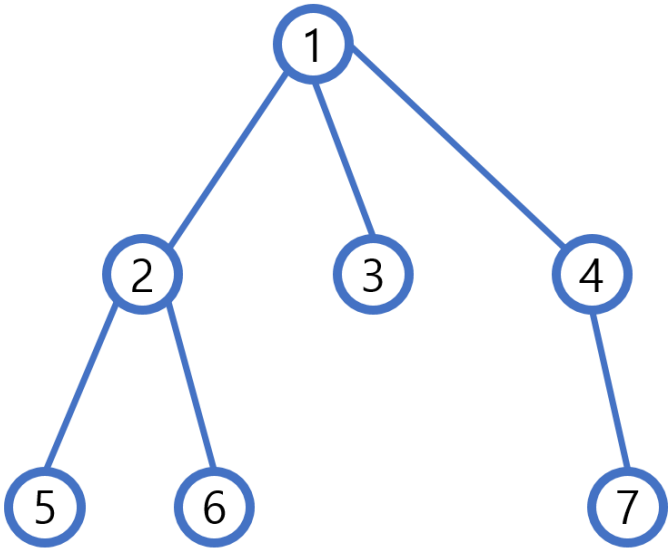

Figure 1) A rooted tree with 6 nodes.

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)!

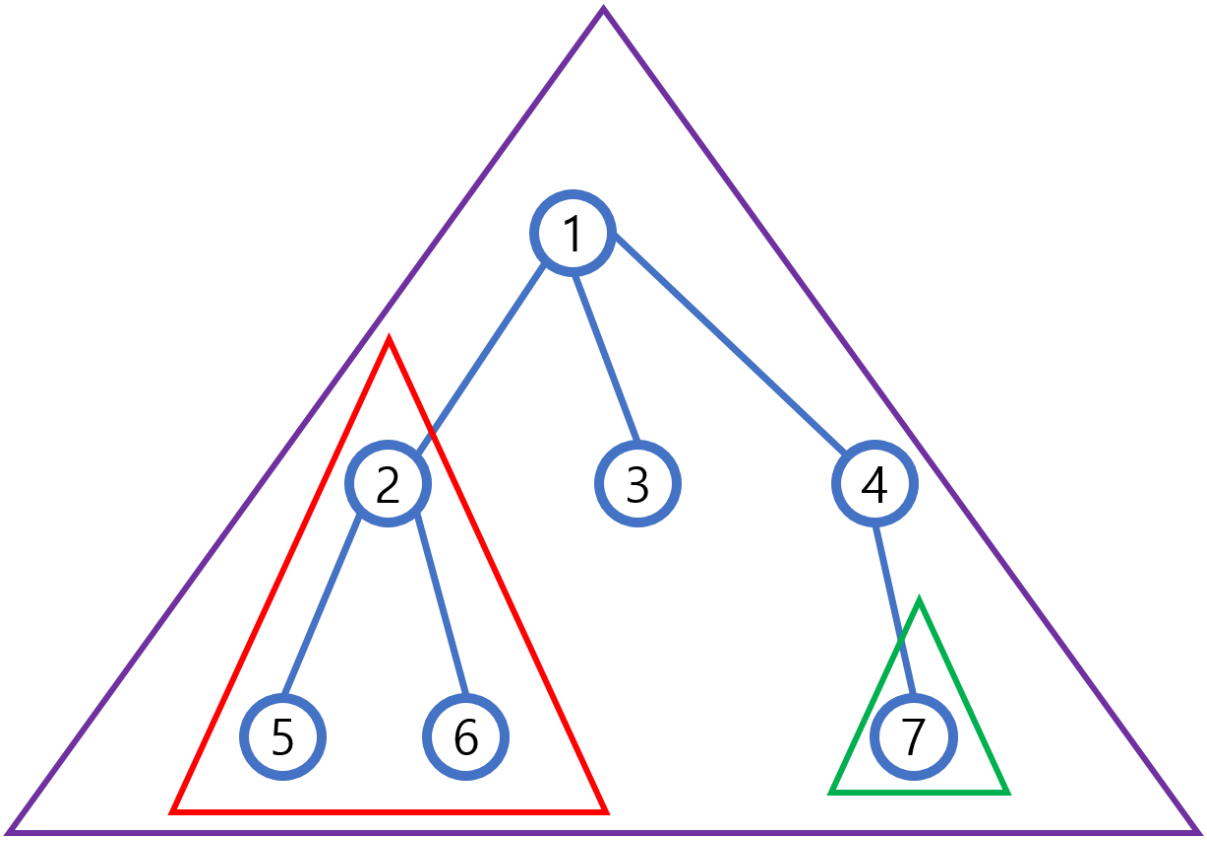

Figure 2) Some subtrees of Figure 1

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 <= n <= 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 <= p_(i+1) <= 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 1 1 1 2 2 4	7 3 1 2 1 1 1