Query on a tree VI

You are given a tree (an acyclic undirected connected graph) with **n** nodes. The tree nodes are numbered from 1 to **n**. Each node has a color, white or black. All the nodes are black initially. We will ask you to perform some instructions of the following form:

- **0 u**: ask for how many nodes are connected to **u**, two nodes are connected if all the node on the path from **u** to **v** (inclusive **u** and **v**) have the same color.
- **1 u**: toggle the color of **u** (that is, from black to white, or from white to black).

Input

The first line contains a number **n** that denotes the number of nodes in the tree ($1 \leq \mathbf{n} \leq 10^5$). In each of the following **n-1** lines, there will be two numbers (**u**, **v**) that describes an edge of the tree ($1 \leq \mathbf{u}, \mathbf{v} \leq \mathbf{n}$). The next line contains a number **m** denoting number of operations we are going to process ($1 \leq \mathbf{m} \leq 10^5$). Each of the following **m** lines describe an operation (**t**, **u**) as we mentioned above($0 \leq \mathbf{t} \leq 1$, $1 \leq \mathbf{u} \leq \mathbf{n}$).

Output

For each query operation, output the corresponding result.

Example

Input 1:
5
1 2
1 3
1 4
1 5
3
0 1
1 1
0 1
Output 1:
5
1

Input 2:
7
1 2
1 3
2 4
2 5
3 6
3 7
4
0 1
1 1
0 2
0 3

Output 2:
7
3
3

Warning: large input/output data,be careful with certain languages