E. Xenia and Tree

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Xenia the programmer has a tree consisting of n nodes. We will consider the tree nodes indexed from 1 to n. We will also consider the first node to be initially painted red, and the other nodes — to be painted blue.

The *distance* between two tree nodes v and u is the number of edges in the shortest path between v and u.

Xenia needs to learn how to quickly execute queries of two types:

1. paint a specified blue node in red;
2. calculate which red node is the closest to the given one and print the shortest distance to the closest red node.

Your task is to write a program which will execute the described queries.

Input

The first line contains two integers n and m $(2 \le n \le 10^5, 1 \le m \le 10^5)$ — the number of nodes in the tree and the number of queries. Next n - 1 lines contain the tree edges, the i-th line contains a pair of integers a_i, b_i $(1 \le a_i, b_i \le n, a_i \ne b_i)$ — an edge of the tree.

Next m lines contain queries. Each query is specified as a pair of integers t_i, v_i $(1 \le t_i \le 2, 1 \le v_i \le n)$. If $t_i = 1$, then as a reply to the query we need to paint a blue node v_i in red. If $t_i = 2$, then we should reply to the query by printing the shortest distance from some red node to node v_i.

It is guaranteed that the given graph is a tree and that all queries are correct.

Output

For each second type query print the reply in a single line.

Examples

input
5 4 1 2 2 3 2 4 4 5 2 1 2 5 1 2 2 5

output
0 3 2