Shortest vertices

• **Problem**

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.

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- ## 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.

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- ## Output

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

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- **Test case**

input
5 4 1 2 2 3 2 4 4 5 2 1 2 5 1 2 2 5
output
0 3 2