

Jumping Lights

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 512 mebibytes

You are given a tree: an undirected connected graph on n vertices with $n - 1$ edges. Initially, none of the vertices are marked. Your task is to process q queries of the following three types:

- “0 w ”: unmark vertex w ; if w is not marked, nothing happens.
- “1 w ”: mark vertex w ; if w is marked, nothing happens.
- “2”: simultaneously for all vertices in the tree: mark the vertex if it has at least one marked neighbor, otherwise unmark it.

After each query, find how many marked vertices are there in the tree.

Input

The first line contains two integers n and q ($2 \leq n \leq 3 \cdot 10^5$; $1 \leq q \leq 10^6$): the number of vertices in the tree and the number of queries, respectively.

Each of the next $n - 1$ lines describes an edge of the tree by two integers u and v ($1 \leq u, v \leq n$).

Each of the next q lines represents a query in the format shown above ($1 \leq w \leq n$).

Output

Print a single line with q integers: the number of marked vertices in the tree after each query.

Examples

<i>standard input</i>	<i>standard output</i>
8 8 1 2 2 3 2 4 1 5 5 6 5 7 5 8 1 1 2 2 0 1 0 3 0 4 0 5 2	1 2 6 5 4 3 3 1
4 5 1 2 1 3 2 4 1 2 2 0 4 2 2	1 2 1 2 2