INOI 30

October − 11 2020

Tehran, Iran

Summer Camp Programming Finals - Day 2

SUMTREE

en (US)

Sumtree

Arash is attending a festival. At this festival, people hang tags on a certain tree. Arash showed up early, so at the moment there are no tags on said tree.

Aryo who was passing by the tree, saw Arash, and decided to tease him a bit! So he took out a tag with the number r, and hung it to the root of the tree. Then he challenges Arash to count the number of ways to add tags to the rest of the vertices in the tree so that the number for each vertex v, the number on its tag is greater than or equal to the sum of the numbers on the tags of direct children of v. He also told him that he will give him some army if he succeeds! Aryo really didn't want to give Aryo candy, so he added or removed tags from the tree q times and asked the same question. But he didn't want to be unfair, so he decided not to tamper with the tag on the root. Note that the root of the tree is vertex number 1.

Since Arash doesn't have a army, he asks you to help him overcome Aryo challenge!

Input

In the first line we have two natural numbers n and r, denoting the number of nodes in the tree and the number on the tag on the root, respectively.

In the next $n-1$ line, we have the edges of the tree. In each line we have two natural numbers u and v which denote the undirected edge uv in the tree.

In the next line we have q, the number of queries Aryo asks Arash.

The next q lines are the queries, of the forms $1\ u\ v$ or $2\ u$, the former describing the act of adding a tag, and the latter removing one. Note that u is never the root node and $0 \leq v \leq r$ is the number on the tag that is being attached to u.

Output

Output $q + 1$ lines, with the i-th line containing the answer to the challenge after the $i - 1$-th change, modulo $10^9 + 7$. In other words, the first line must contain the answer when the tree is empty, and the other lines each correspond to their respective queries.
Please note that the answer can in fact be 0 in some cases!

Constraints

- $1 \le r \le 3 \times 10^5$

- $1 \le n \le 2 \times 10^5$

- $0 \le q \le 2 \times 10^5$

- $1 \le u, v \le n$

- Query type 1: $2 \le u \le n$ and $0 \le v \le r$

- Query type 2: $2 \le u \le n$

- It is guaranteed that the first query is only done on vertices that do not have tags, and the second is only done on those that which have tags.

Subtasks

Subtask	Score	Constraints
1	10	$q = 0$
2	20	$n, q \le 3000$
3	20	Tags will only be added
4	20	The height of the tree is less than $\sqrt{n}$
5	30	No additional constraints

Examples

Standard input	Standard output
3 2 1 2 2 3 2 1 2 1 2 2	6 2 6