

# Gwyneth and Tree

On Gwyneth's birthday, she was given a tree consisting of  $n$  nodes by her friend. Furthermore, the nodes are numbered 1 to  $n$ .

One day when she was talking to her friend at the back of the class when her friend challenged her to play a game with her. The rules are as follows. We will first paint the first node red, and the other nodes are all blue.

The distance between 2 nodes  $v$  and  $u$  is the number of edges in the shortest path between  $v$  and  $u$ . (edges are bi-directional)

Her friend will also perform some operations and queries:

1. Splash red paint on a specified blue node (making it red)
2. Find which red node is the closest to the provided node and print the shortest distance to the closest red node. (Note  $u$  **don't** have to output the index of the closest node, **just** the distance)

Pls help Gwyneth answer the queries! ~~so that she'll be impressed with you.~~

## Input Format

The first line contains two integers  $n$  and  $m$  ( $2 \leq n \leq 10^5, 1 \leq m \leq 10^5$ ) — 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  $a_i, b_i$  ( $1 \leq a_i, b_i \leq n, a_i \neq b_i$ ) — an edge of the tree.

Next  $m$  lines contain the queries. Each query is specified as a pair of integers  $t_i, v_i$  ( $1 \leq t_i \leq 2, 1 \leq v_i \leq n$ ).

If  $t_i=1$ , then 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  $v_i$ .

**Subtask 1 (48%)** will only have cases with ( $2 \leq n \leq 1000, 1 \leq m \leq 1000$ )

**Subtask 2 (52%)** No additional constraints.

Sample input 1:

```
5 4
1 2
2 3
2 4
4 5
2 1
2 5
1 2
2 5
```

Sample output 1:

```
0
3
2
```