# NOI '21 P1 - Light Heavy Edges

**Time limit:** 1.0s **Memory limit:** 1G

There is a tree with $n$ vertices. An edge of the tree may be either a light edge or a heavy edge. You need to perform $m$ operations on the tree. Initially, all edges on the tree are light edges. There are two operations:

1. Given two vertices $a$ and $b$, for all $x$ on the path between $a$ and $b$ (including $a$ and $b$ themselves), you need to turn all edges connected with $x$ into light edges, and turn all edges on the path between $a$ and $b$ into heavy edges.
2. Given two vertices $a$ and $b$, you need to compute the number of heavy edges on the path between $a$ and $b$.

## Input Specification

The first line is an integer $T$ denoting the number of test cases. $T$ test cases follow, each formatted as follows.

For each test case, the first line has two integers $n$ and $m$ where $n$ is the number of vertices and $m$ is the number of operations.

For the next $n-1$ lines, each line contains two integers $u$ and $v$ denoting an edge of the tree.

For the next $m$ lines, each line contains three integers $op_i, a_i, b_i$ denoting an operation. $op_i = 1$ means the operation is an operation of the first type, while $op_i = 2$ means the operation is an operation of the second type.

It's guaranteed that $a_i \neq b_i$ in all operations.

## Output Specification

For each operation of the second type, output an integer denoting the answer to the query.

## Sample Input 1

```
1
7 7
1 2
1 3
3 4
3 5
3 6
6 7
1 1 7
2 1 4
2 2 7
1 1 5
2 2 7
1 2 1
2 1 7
```

## Sample Output 1

```
1
3
2
1
```

## Explanation for Sample Output 1

After operation 1, the heavy edges are $(1,3)$; $(3,6)$; $(6,7)$.

In operation 2, the only heavy edge on the path from vertex $1$ to vertex $4$ is $(1,3)$.

In operation 3, the heavy edges on the path from vertex $2$ to vertex $7$ are $(1,3)$; $(3,6)$; $(6,7)$.

After operation 4, $(1,3)$ and $(3,6)$ will become light edges first, and then $(1,3)$ and $(3,5)$ will become heavy edges.

In operation 5, the heavy edges on the path from vertex $2$ to vertex $7$ are $(1,3)$ and $(6,7)$.

After operation 6, edge $(1,3)$ will become a light edge while $(1,2)$ will become a heavy edge.

In operation 7, the heavy edge on the path from vertex $1$ to vertex $7$ is edge $(6,7)$.

## Additional Samples

Sample inputs and outputs can be found here.

- Sample 2 ( `edge2.in` and `edge2.ans` ) corresponds to cases 3-6.

- Sample 3 ( `edge3.in` and `edge3.ans` ) corresponds to cases 9-10.
- Sample 4 ( `edge4.in` and `edge4.ans` ) corresponds to cases 11-14.
- Sample 5 ( `edge5.in` and `edge5.ans` ) corresponds to cases 17-20.

## Constraints

For all test sets, $T \leq 3$, $1 \leq n, m \leq 10^5$.

| Test Case | $n, m \leq$ | Additional Constraints |
|---|---|---|
| 1~2 | $10$ | None. |
| 3~6 | $5000$ | |
| 7~8 | $10^5$ | A,B |
| 9~10 | | A |
| 11~14 | | B |
| 15~16 | $2 \times 10^4$ | None. |
| 17~20 | $10^5$ | |

Constraint A means the tree is a path.
Constraint B means for operations of the second type, $a_i$ and $b_i$ are directly connected by an edge.