Tree Splitting

HackerRank

Given a tree with vertices numbered from 1 to n. You need to process m queries. Each query represents a vertex number encoded in the following way:

Queries are encoded in the following way: Let, m_j be the j^{th} query and ans_j be the answer for the j^{th} query where $1 \leq j \leq \ m$ and ans_0 is always 0. Then vertex $v_j = ans_{j-1} \oplus m_j$. We are assure that v_j is between 1 and n, and hasn't been removed before.

Note: $\oplus$ is the bitwise XOR operator.

For each query, first decode the vertex v and then perform the following:

1. Print the size of the connected component containing v.
2. Remove vertex v and all edges connected to v.

Input Format

The first line contains a single integer, n, denoting the number of vertices in the tree.
Each line i of the $n-1$ subsequent lines (where $0 \leq i < n$) contains 2 space-separated integers describing the respective nodes, u_i and v_i, connected by edge i.
The next line contains a single integer, m, denoting the number of queries.
Each line j of the m subsequent lines contains a single integer, vertex number m_j.

Constraints

- $1 \leq n, m \leq 2 \cdot 10^5$.

Output Format

For each query, print the size of the corresponding connected component on a new line.

Sample Input 0

```
3
1 2
1 3
3
1
1
2
```

Sample Output 0

```
3
1
1
```

Sample Input 1

```
4
1 2
1 3
1 4
4
3
6
2
6
```

Sample Output 1

```
4
3
2
1
```

Explanation

Sample Case 0:
We have, ans_0 = 0 and connected component : $[1, 2, 3]$
$query_1$ has vertex = $ans_0 \oplus m_1$ = $0 \oplus 1$ = 1. The size of connected component containing 1 is 3.
So, ans_1 = 3. Removing vertex 1 and all of it's edges, we get two disconnected components : $[2], [3]$
$query_2$ has vertex = $ans_1 \oplus m_2$ = $3 \oplus 1$ = 2. The size of connected component containing 2 is 1.
So, ans_2 = 1.
Removing vertex 2 and all of it's edges, we are left with only one component : $[3]$
$query_3$ has vertex = $ans_2 \oplus m_3$ = $1 \oplus 2$ = 3. The size of connected component containing 3 is 1.
So, ans_3 = 1.
Removed vertex 3.

Sample Case 1:
We have, ans_0 = 0 and connected component : $[1, 2, 3, 4]$
$query_1$ has vertex = $ans_0 \oplus m_1$ = $0 \oplus 3$ = 3. The size of connected component containing 3 is 4.
So, ans_1 = 4.
Removing vertex 3 and all of it's edges, we get component : $[1, 2, 4]$
$query_2$ has vertex = $ans_1 \oplus m_2$ = $4 \oplus 6$ = 2. The size of connected component containing 2 is 3.
So, ans_2 = 3.
Removing vertex 2 and all of it's edges, now, we get two disconnected components : $[1, 4]$
$query_3$ has vertex = $ans_2 \oplus m_3$ = $3 \oplus 2$ = 1. The size of connected component containing 1 is 2.
So, ans_3 = 2.
Removing vertex 1 and all of it's edges, now we are left with only one component : $[4]$
$query_4$ has vertex = $ans_3 \oplus m_4$ = $2 \oplus 6$ = 4. The size of connected component containing 4 is 1.
So, ans_4 = 1.
Removed vertex 4.