Problem K
Tree Number Generator
Time Limit: 13 seconds



Image by Rajesh Misra

One day Young Anna comes up with a whimsical idea of using a tree to create a number generator. The generator is created with a modulus m and an internal tree of n nodes numbered from 1 to n. Each tree node is assigned a single digit between 0 to 9. The generator provides a method $Get(a, b)$ that can be used to produce an integer in $[0, m)$. The two arguments a and b specify two tree nodes. The generator walks the path from a to b in the tree, concatenates all the digits along the path (including the digits of node a and b), and obtains a decimal integer v as a result of such digit concatenation. Note that v can be quite large and may contain leading zeroes. The return value of $Get(a, b)$ is v modulo m.

Given a tree and the value of m to be used by Anna's number generator, calculate the return values of q queries $Get(a, b)$.

Input

The first line of input has three integers n ($2 \le n \le 2 \cdot 10^5$), m ($1 \le m \le 10^9$), and q ($1 \le q \le 2 \cdot 10^5$).

The next $n - 1$ lines describe the tree edges. Each line has two integers x, y ($1 \le x, y \le n$) listing an edge connecting node x and node y. It is guaranteed that those edges form a tree.

The next n lines each have a single digit between 0 to 9. The ith digit is assigned to node i.

The next q lines each have two integers a, b ($1 \le a, b \le n$) specifying a query $Get(a, b)$.

Output

For each $Get(a, b)$ query output its return value on a single line.

Sample Input 1

```
5 100 4
1 2
1 3
1 4
5 3
1
2
3
0
4
1 5
5 1
4 2
3 3
```

Sample Output 1

```
34
31
12
3
```