

E. Prince's Problem

time limit per test: 3 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Let the main characters of this problem be personages from some recent movie. New Avengers seem to make a lot of buzz. I didn't watch any part of the franchise and don't know its heroes well, but it won't stop me from using them in this problem statement. So, Thanos and Dr. Strange are doing their superhero and supervillain stuff, but then suddenly they stumble across a regular competitive programming problem.

You are given a tree with n vertices.

In each vertex v there is positive integer a_v .

You have to answer q queries.

Each query has a from u v x .

You have to calculate $\prod_{w \in P} \gcd(x, a_w) \bmod (10^9 + 7)$, where P is a set of vertices on path from u to v . In other words, you are to calculate the product of $\gcd(x, a_w)$ for all vertices w on the path from u to v . As it might be large, compute it modulo $10^9 + 7$. Here $\gcd(s, t)$ denotes the greatest common divisor of s and t .

Note that the numbers in vertices **do not** change after queries.

I suppose that you are more interested in superhero business of Thanos and Dr. Strange than in them solving the problem. So you are invited to solve this problem instead of them.

Input

In the first line of input there is one integer n ($1 \leq n \leq 10^5$) — the size of the tree.

In the next $n-1$ lines the edges of the tree are described. The i -th edge is described with two integers u_i and v_i ($1 \leq u_i, v_i \leq n$) and it connects the vertices u_i and v_i . It is guaranteed that graph with these edges is a tree.

In the next line there are n integers a_1, a_2, \dots, a_n ($1 \leq a_v \leq 10^7$).

In the next line there is one integer q ($1 \leq q \leq 10^5$) — the number of queries.

And in the next q lines the queries are described. Each query is described with three integers u_i, v_i and x_i ($1 \leq u_i, v_i \leq n, 1 \leq x_i \leq 10^7$).

Output

Print q numbers — the answers to the queries in the order they are given in the input. Print each answer modulo $10^9 + 7 = 1000000007$. Print each number on a separate line.

Examples

input
4 1 2 1 3 1 4 6 4 9 5 3 2 3 6 2 3 2 3 4 7
output

36
4
1

input

6
1 2
2 3
2 4
1 5
5 6
100000 200000 500000 40000 800000 250000
3
3 5 10000000
6 2 3500000
4 1 64000

output

196000
12250
999998215