

C. Kamil and Making a Stream

time limit per test: 4 seconds

memory limit per test: 768 megabytes

input: standard input

output: standard output

Kamil likes streaming the competitive programming videos. His MeTube channel has recently reached 100 million subscribers. In order to celebrate this, he posted a video with an interesting problem he couldn't solve yet. Can you help him?

You're given a tree — a connected undirected graph consisting of n vertices connected by $n - 1$ edges. The tree is rooted at vertex 1. A vertex u is called an *ancestor* of v if it lies on the shortest path between the root and v . In particular, a vertex is an ancestor of itself.

Each vertex v is assigned its *beauty* x_v — a non-negative integer not larger than 10^{12} . This allows us to define the beauty of a path. Let u be an ancestor of v . Then we define the beauty $f(u, v)$ as the greatest common divisor of the beauties of all vertices on the shortest path between u and v . Formally, if $u = t_1, t_2, t_3, \dots, t_k = v$ are the vertices on the shortest path between u and v , then $f(u, v) = \gcd(x_{t_1}, x_{t_2}, \dots, x_{t_k})$. Here, \gcd denotes the greatest common divisor of a set of numbers. In particular, $f(u, u) = \gcd(x_u) = x_u$.

Your task is to find the sum

$$\sum_{u \text{ is an ancestor of } v} f(u, v).$$

As the result might be too large, please output it modulo $10^9 + 7$.

Note that for each y , $\gcd(0, y) = \gcd(y, 0) = y$. In particular, $\gcd(0, 0) = 0$.

Input

The first line contains a single integer n ($2 \leq n \leq 100\,000$) — the number of vertices in the tree.

The following line contains n integers x_1, x_2, \dots, x_n ($0 \leq x_i \leq 10^{12}$). The value x_v denotes the beauty of vertex v .

The following $n - 1$ lines describe the edges of the tree. Each of them contains two integers a, b ($1 \leq a, b \leq n, a \neq b$) — the vertices connected by a single edge.

Output

Output the sum of the beauties on all paths (u, v) such that u is ancestor of v . This sum should be printed modulo $10^9 + 7$.

Examples

input	Copy
<pre>5 4 5 6 0 8 1 2 1 3 1 4 4 5</pre>	
output	Copy
42	
input	Copy
<pre>7 0 2 3 0 0 0 0 1 2 1 3 2 4 2 5</pre>	

Dasha Code Championship - SPb Finals Round (only for onsite-finalists)

Finished

Practice



→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++11 5.1.0

Choose file: 未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

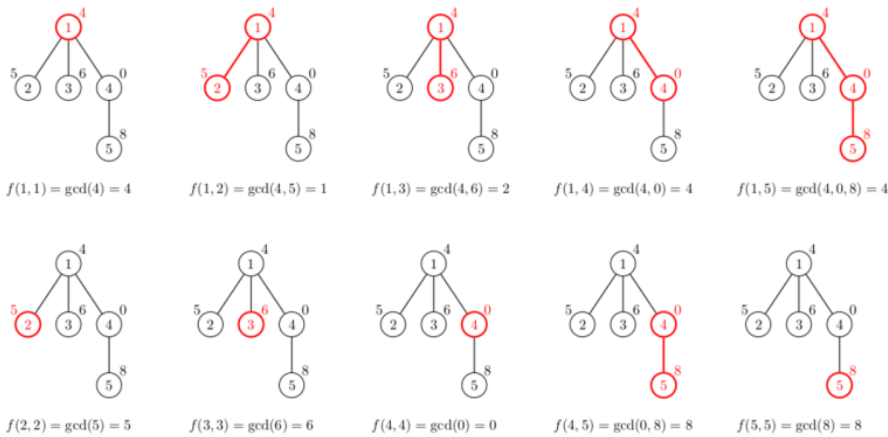
→ Problem tags

math number theory trees

No tag edit access

3 6 3 7	
output	Copy
30	

Note
The following figure shows all 10 possible paths for which one endpoint is an ancestor of another endpoint. The sum of beauties of all these paths is equal to 42:



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