Tree-stían

Problem

You are given an integer N and $N - 1$ bidirectional edges. These edges connect N vertices in such a way that there is a path[1] between any two vertices (i.e., they form a tree). Additionally, each vertex has a weight. For all paths, we define their weight as the product of the number of edges in it and the **greatest common divisor** of each of the weights of the vertices in the path. Determine the simple path (that does not repeat edges) with the maximum weight.

Implementation Details

You must implement the function *Tree-stian()*. This function receives an integer N, 2 vectors u, v with $N-1$ elements, and a vector w, with N elements. For each $0 \leq i \leq N-2$, $u[i]$ and $v[i]$ are the vertices that are connected by the edge i. For each $0 \leq i \leq N-1$, $w[i]$ is the weight of the vertex i. This function must return an integer, the maximum weight of a path in the tree. The function would look like this:

```
#include <bits/stdc++.h>
using namespace std;

long long int Tree-stian(int N, vector<int> u, vector<int> v, vector<int> w) {
    // Implement this function.
}
```

The evaluator will call the function **multiple** times per test case.

Examples

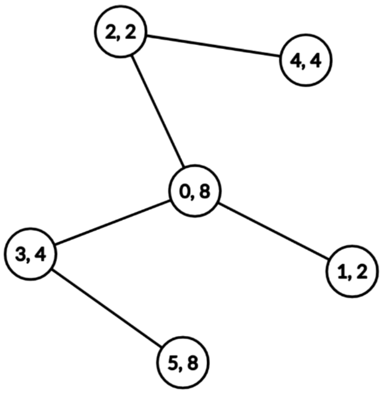
Example 1:

- The evaluator calls the function

  Tree-stian(6, {0, 0, 0, 2, 3}, {1, 2, 3, 4, 5}, {8, 2, 2, 4, 4, 8})

  the tree in this example is as follows:

[1] A path is defined as a sequence of vertices, such that for any two consecutive vertices, there is an edge connecting them.



- The possible paths and their weights in this tree are:

$dist(a, b)$	0	1	2	3	4	5
0	0	2	2	4	4	8
1	2	0	4	4	6	6
2	2	4	0	4	2	6
3	4	4	4	0	6	4
4	4	6	2	6	0	8
5	8	6	6	4	8	0

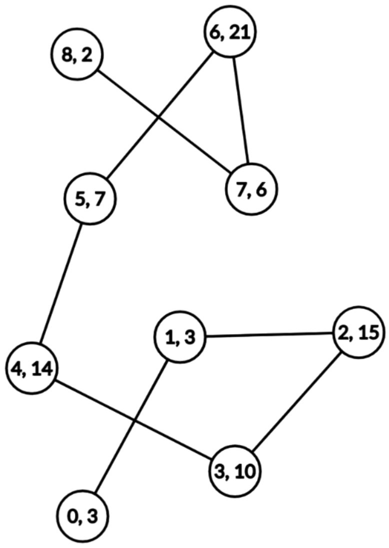
- The correct answer is 8.

Example 2:

- The evaluator calls the function

  Tree-stian(9, {0, 1, 2, 3, 4, 5, 6, 7}, {1, 2, 3, 4, 5, 6, 7, 8}, {3, 3, 15, 10, 14, 7, 21, 6, 2})

  the tree in this example is as follows:



- The correct answer is 14.

Considerations

- $1 \leq N \leq 2 \times 10^5$.
- The vectors u and v will have exactly $N - 1$ elements.
- The vector w will have exactly N elements.
- For each $0 \leq i \leq N - 2$, it holds that $0 \leq u[i] \neq v[i] < N$.
- For each $0 \leq i \leq N - 1$, it holds that $1 \leq w[i] \leq 10^6$.
- It is guaranteed that the graph formed by the edges is a tree.
- Let S_N be the sum of all values of N across all function calls. It is guaranteed that $S_N \leq 2 \times 10^5$.

Subtasks

- (3 points) $N, S_N \leq 2000$.
- (9 points) For all $0 \leq i \leq N - 1$, it holds that $w[i] = 1$.
- (11 points) For all $0 \leq i \leq N - 2$, it holds that $\gcd(w[u[i]], w[v[i]])$ is a prime number.
- (22 points) For all $0 \leq i \leq N - 1$, it holds that $w[i]$ is a power of 2.
- (22 points) For all $0 \leq i \leq N - 2$, it holds that $u[i] = i, v[i] = i + 1$.
- (33 points) No additional restrictions.