Xor Tree

Problem

You are given an integer N and $N-1$ edges with weights. These edges connect N vertices in such a way that there exists a path[1] between any two vertices (i.e. they form a tree). For each path, we define its weight as the **xor** [2] of each of the weights of the edges that make up the path. Determine the sum of the weights of all simple paths (paths that do not repeat edges) in the tree [3].

Implementation Details

You must implement the function *Encuentra_xor()*. This function receives an integer N, 3 vectors u, v, and w, each with $N-1$ elements. For each $0 \leq i \leq N-2$, $u[i]$ and $v[i]$ are the vertices connected by edge i, and $w[i]$ is its weight. This function must return an integer, the sum of the weights of all the paths. The function would look like this:

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

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

The grader will call the function **multiple** times for each case.

Examples

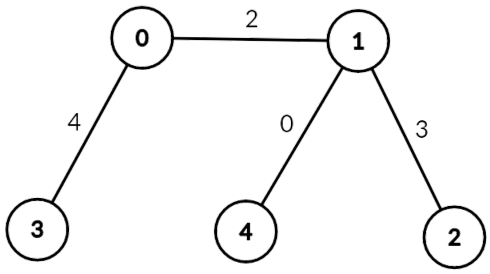
Example 1:

- The grader calls the function

  $$Encuentra\_xor(5, \{0, 1, 0, 4\}, \{1, 2, 3, 1\}, \{2, 3, 4, 0\})$$

  the tree in this case is illustrated in the following image:

[1] A path in a graph is defined as a sequence of k vertices $\{v_1, v_2, \cdots, v_k\}$, such that for all $1 \leq i \leq k-1$, the edge $\{v_i, v_{i+1}\}$ exists in the graph.
[2] Exclusive or, here we define it as the bitwise operation.
[3] The path $\{a, b\}$ is considered the same as $\{b, a\}$.



- The xors of the paths are:

$\oplus$	0	1	2	3	4
0	0	2	1	4	2
1	2	0	3	6	0
2	1	3	0	5	3
3	4	6	5	0	6
4	2	0	3	6	0

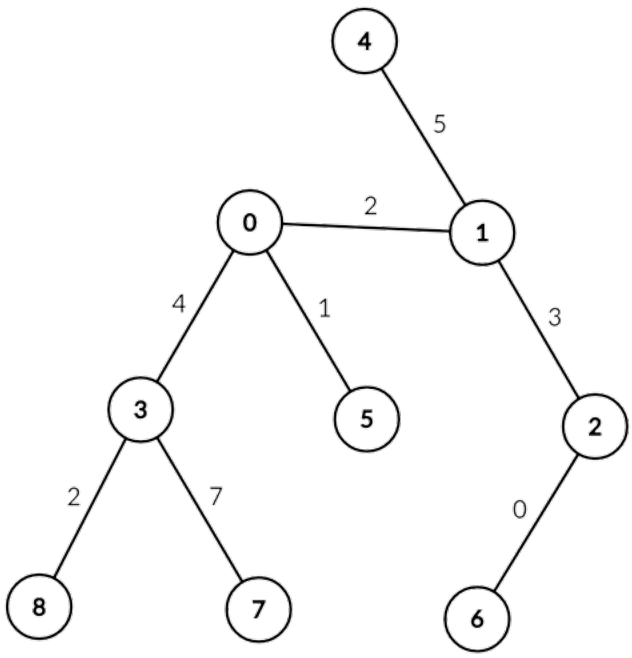
- The function must return 32, the sum of the xor of all the paths (the path $\{a, b\}$ is considered the same as $\{b, a\}$).

Example 2:

- The evaluator calls the function

  Encuentra_xor(9, {0, 1, 0, 1, 0, 2, 3, 3}, {1, 2, 3, 4, 5, 6, 7, 8}, {2, 3, 4, 5, 1, 0, 7, 2})

  the tree in this case is as follows:



- The function must return 132.

Constrains

- $1 \le N \le 2 \times 10^5$.
- The vectors u, v, and w will each have exactly $N - 1$ elements.
- For each $0 \le i \le N - 2$, it holds that $0 \le u[i] \ne v[i] < N$.
- For each $0 \le i \le N - 2$, it holds that $0 \le w[i] \le 10^9$.
- It is guaranteed that the graph formed by the edges is a tree.
- Let S_N be the total sum of the values of N over all the times the function is called during a case. It is guaranteed that $S_N \le 2 \times 10^5$.

Subtasks

- (10 points) $N, S_N \le 2000$.
- (20 points) For all $0 \le i \le N - 2$, it holds that $w[i] \le 1$.
- (25 points) For all $0 \le i \le N - 2$, it holds that $u[i] = i, v[i] = i + 1$.
- (45 points) No additional constraints.