Determine Edges

Problem

You are given an integer N and $N-1$ bidirectional edges. 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). You must assign weights to each of the edges such that the following property holds in the tree:
For every integer x between 1 and $\left\lfloor \frac{2N^2}{9} \right\rfloor$, there exists a pair of vertices i, j such that the sum of the weights on the simple path[2] between i and j is equal to x.

Implementation Details

You must implement the function *Determinar_aristas()*. This function receives an integer N and two vectors u and v, 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. This function must return a vector with $N-1$ elements, the weights you chose. The function would look like this:

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

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

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

Example

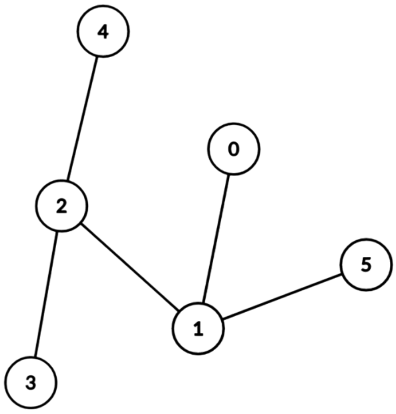
Example 1:

- The grader calls the function

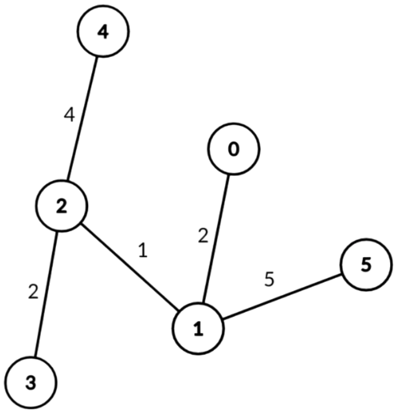
  $$\textit{Determinar\_aristas}(6, \{0, 1, 2, 2, 1\}, \{1, 2, 3, 4, 5\})$$

  the tree in this case is as follows:

[1]Sequence of vertices such that any two adjacent vertices belong to an edge of the graph.
[2]That does not repeat edges.



- You could obtain the full points for this case by returning the vector {2, 1, 2, 4, 5}. Which corresponds to the following choice of edges:



  This is because:

  - The path between vertices $(1, 2)$ has a weight of 1.
  - The path between vertices $(0, 1)$ has a weight of 2.
  - The path between vertices $(0, 2)$ has a weight of 3.
  - The path between vertices $(2, 4)$ has a weight of 4.
  - The path between vertices $(1, 5)$ has a weight of 5.
  - The path between vertices $(2, 5)$ has a weight of 6.
  - The path between vertices $(0, 5)$ has a weight of 7.
  - The path between vertices $(3, 5)$ has a weight of 8.

Constraints

- $1 \leq N \leq 2000$.

- The vectors u and v will have exactly $N - 1$ elements.
- For each $0 \le i \le N - 2$, it holds that $0 \le u[i] \ne v[i] \le N - 1$.
- It is guaranteed that the graph formed by the edges is a tree.
- Let S_N be the sum of the values of N over all calls to the function in a case. It holds that $S_N \le 2000$.

Subtasks

- (6 points) $N \le 4$.
- (7 points) You will obtain the points for this subtask if your choice of edges satisfies the condition for $1 \le x \le N$.
- (22 points) For all $0 \le i \le N - 2$, it holds that $u[i] = i + 1, v[i] = i + 2$.
- (25 points) For all $0 \le i \le N - 2$, it holds that $u[i] = i + 1, v[i] = \left\lfloor \frac{i}{2} \right\rfloor$.
- (40 points) No additional restrictions.