Problem B. 8

Time Limit 4000 ms

Problem Statement

You are given a tree with N vertices. The i-th edge connects vertices u_i and v_i bidirectionally.

Additionally, you are given an integer sequence $A = (A_1, \ldots, A_N)$.

Here, define $f(i, j)$ as follows:

- If $A_i = A_j$, then $f(i, j)$ is the minimum number of edges you need to traverse to move from vertex i to vertex j. If $A_i \neq A_j$, then $f(i, j) = 0$.

Calculate the value of the following expression:

$$\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} f(i, j).$$

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $1 \leq u_i, v_i \leq N$
- $1 \leq A_i \leq N$
- The input graph is a tree.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

```
N
u_1  v_1
⋮
```

$$u_{N-1} \quad v_{N-1}$$
$$A_1 \quad A_2 \quad \ldots \quad A_N$$

Output

Print the answer.

Sample 1

Input	Output
4 3 4 4 2 1 2 2 1 1 2	4

$f(1, 4) = 2, f(2, 3) = 2$. For all other i, j $(1 \le i < j \le N)$, we have $f(i, j) = 0$, so the answer is $2 + 2 = 4$.

Sample 2

Input	Output
8 8 6 3 8 1 4 7 8 4 5 3 4 8 2 1 2 2 2 3 1 1 3	19