Cut the tree

Problem Statement

Atul is into graph theory, and he is learning about trees nowadays. He observed that the removal of an edge from a given tree T will result in the formation of two separate trees, $T1$ and $T2$.

Each vertex of the tree T is assigned a positive integer. Your task is to remove an edge, such that the **Tree_diff** of the resultant trees is minimized. **Tree_diff** is defined as the following:

```
F(T) = Sum of numbers written on each vertex of a tree T
Tree_diff(T) = abs(F(T1) - F(T2))
```

Input Format

The first line will contain an integer N, i.e. the number of vertices in the tree.
The next line will contain N integers separated by a single space, i.e. the values assigned to each of the vertices.
The next $N-1$ lines contain a pair of integers eah, separated by a single space, that denote the edges of the tree.
In the above input, the vertices are numbered from 1 to N.

Output Format

A single line containing the minimum value of **Tree_diff**.

Constraints

$3 \leq N \leq 10^5$
$1 \leq$ number written on each vertex ≤ 1001

Sample Input

```
6
100 200 100 500 100 600
1 2
2 3
2 5
4 5
5 6
```

Sample Output

```
400
```

Explanation

Originally, we can represent tree as

```
    1(100)
     \
      2(200)
     / \
 (100)5   3(100)
    / \
(500)4   6(600)
```

Cutting the edge at `1 2` would result in `Tree_diff = 1500-100 = 1400`

Cutting the edge at `2 3` would result in `Tree_diff = 1500-100 = 1400`
Cutting the edge at `2 5` would result in `Tree_diff = 1200-400 = 800`
Cutting the edge at `4 5` would result in `Tree_diff = 1100-500 = 600`
Cutting the edge at `5 6` would result in `Tree_diff = 1000-600 = 400`

Hence, the answer is 400.