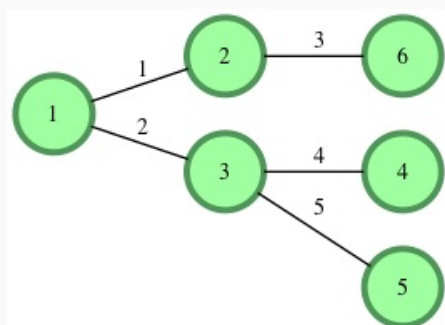


Anna loves graph theory! She has a tree where each vertex is numbered from **1** to **n** , and each contains a data value.

The *sum* of a tree is the sum of all its nodes' data values. If she cuts an edge in her tree, she forms two smaller trees. The *difference* between two trees is the absolute value between their sums.

Given a tree, determine which edge to cut so that the resulting trees have a minimal *difference* between them, then return that difference.

For example, your tree's nodes have weights of **[1, 2, 3, 4, 5, 6]**. In this case, node numbers match their weights for convenience. In the diagram below, you have the following edges: **[(1, 2), (1, 3), (2, 6), (3, 4), (3, 5)]**.



The values are calculated as follows:

Edge Cut	Tree 1 Sum	Tree 2 Sum	Absolute Difference
1	8	13	5
2	9	12	3
3	6	15	9
4	4	17	13
5	5	16	11

The minimum absolute difference is **3**.

Note: The tree is *always* rooted at vertex **1**.

Function Description

Complete the `cutTheTree` function in the editor below. Return an integer that represents the minimal absolute difference achievable between the resultant two trees.

`cutTheTree` has the following parameter(s):

- *data*: an array of integers that represent node values
- *edges*: an 2 dimensional array of integer pairs where each pair represents an edge in the graph

Input Format

The first line contains an integer **n** , the number of vertices in the tree.

The second line contains **n** space-separated integers, where each integer **u** denotes the value of **$data[u]$** .

Each of the **$n - 1$** subsequent lines contains two space-separated integers **u** and **v** describing edge **$u \leftrightarrow v$** in tree **t** .

Constraints

- $3 \leq n \leq 10^5$
- $1 \leq data[u] \leq 1001$, where $1 \leq u \leq n$.

Output Format

A single line containing the minimum *difference* possible for tree **t** .

Sample Input

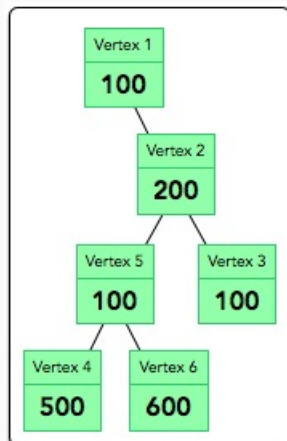
```
6
100 200 100 500 100 600
1 2
2 3
2 5
4 5
5 6
```

Sample Output

400

Explanation

We can visualize the initial, uncut tree as:



There are $n - 1 = 5$ edges we can cut:

1. Edge $1 \leftrightarrow 2$ results in $d_{1 \leftrightarrow 2} = 1500 - 100 = 1400$
2. Edge $2 \leftrightarrow 3$ results in $d_{2 \leftrightarrow 3} = 1500 - 100 = 1400$
3. Edge $2 \leftrightarrow 5$ results in $d_{2 \leftrightarrow 5} = 1200 - 400 = 800$
4. Edge $4 \leftrightarrow 5$ results in $d_{4 \leftrightarrow 5} = 1100 - 500 = 600$
5. Edge $5 \leftrightarrow 6$ results in $d_{5 \leftrightarrow 6} = 1000 - 600 = 400$

The minimum *difference* is **400**.