

# Cut the tree

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:

$$F(T) = \text{Sum of numbers written on each vertex of a tree } T$$
$$\text{Tree\_diff}(T) = \text{abs}(F(T1) - F(T2))$$

## 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 (where the first one is the root of the tree).  
The next  $N - 1$  lines contain a pair of integers each, 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

$$3 \leq N \leq 10^5$$
$$1 \leq \text{number written on each vertex} \leq 1001$$

## Sample Input

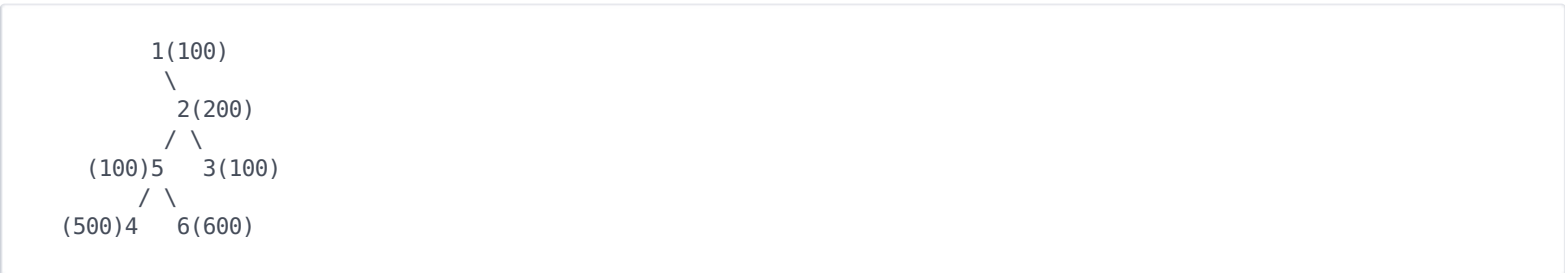
```
6
100 200 100 500 100 600
1 2
2 3
2 5
4 5
5 6
```

## Sample Output

```
400
```

## Explanation

Originally, we can represent tree as



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.