B. Lanran's tree

Description

Lanran has a tree with n nodes, and each node i has a weight w_i. Lanran think that the tree is not beautiful, so he decides to choose a node to become the root of the tree. We define $d(x, y)$ be the distance between node x and y. The distance between the nodes is the number of edges on the simple path between them. The beauty of a tree is $\sum_{i=1}^{n} d(i, root) \cdot w_i$, where $root$ is the chosen root of the tree. Lanran can choose arbitrary node as its root, and he wants to know what is the maximum beauty of the tree.

Input format

The first line contains an integer $n(1 \leq n \leq 200\,000)$.

The next line contains n integers $w_1, w_2, \ldots, w_n (1 \leq w_i \leq 200\,000)$, means the weight of the vertex i.

The next $n - 1$ lines contain i, j each line, indicating there is an edge between i, j.

Sample input

```
8
9 4 1 7 10 1 6 5
1 2
2 3
1 4
1 5
5 6
5 7
5 8
```

Sample output

```
121
```

Limitations & Hints

Limit

1 second for each test case. The memory limit is 256MB.

For 60% of the test cases, $n, w_i \leq 5\,000$.

For 100% of the test cases, $n, w_i \leq 200\,000$.

Hint

The chosen root of the sample test case is 3.