Winter

The prosperous kingdom of Ragden consists of N cities (numbered from 1 to N) connected by $N-1$ roads. The i-th road connects city a_i to city b_i in both directions. There is exactly one sequence of roads connecting each pair of cities in the kingdom.

The i-th city has a *profit value* of p_i. A city can have $p_i < 0$, indicating that it loses money for the kingdom.

The resident weathermancers predict a frigid and chilling winter to come. You've been tasked with choosing **zero or more** cities to remove, along with any roads connected to those cities, so that:

- At least one city remains,
- There is exactly one sequence of roads connecting each pair of remaining cities, and
- The total sum of profit values of the remaining cities is maximised.

After removing cities according to the above constraints, what is the maximum total profit the kingdom can generate?

Subtasks and Constraints

For all subtasks, you are guaranteed that:

- $2 \leq N \leq 100\,000$.
- $-100\,000 \leq p_i \leq 100\,000$ for all i.
- $1 \leq a_i, b_i \leq N$ for all i.
- There is exactly one sequence of roads connecting each pair of cities.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	20	$a_i = i$ and $b_i = i+1$, for all i. That is, the cities form a line.
2	20	p_i is 1 or $-100\,000$ for all i.
3	35	There is always an optimal answer where city 1 remains.
4	25	No additional constraints.

Input

- The first line of input contains the integer N.
- The second line contains N integers $p_1, p_2, \ldots, p_N$.
- The following $N-1$ lines describe the roads. The i-th line contains the two integers a_i and b_i.

Output

Output a single integer: the maximum total sum of profit values possible.

Note: Your solution may involve integers which are large. Consider using 64-bit integers ('long long' in C++) in your solution.

Sample Input 1

```
10
-3 5 -4 2 4 -10 2 0 -1 7
1 9
4 1
6 7
5 6
6 10
10 9
9 8
2 1
3 1
```

Sample Output 1

```
10
```

Sample Input 2

```
6
-5 2 -1 6 -7 4
1 2
2 3
3 4
4 5
5 6
```

Sample Output 2

```
7
```

Sample Input 3

```
9
-100000 1 1 1 1 -100000 1 -100000 1
1 2
2 6
5 6
4 6
6 9
9 7
9 8
9 3
```

Sample Output 3

```
3
```

Sample Input 4

```
3
-3 -5 -6
1 2
2 3
```

Sample Output 4

```
-3
```

Explanation

The sample cases are illustrated below. The remaining cities are shaded orange.

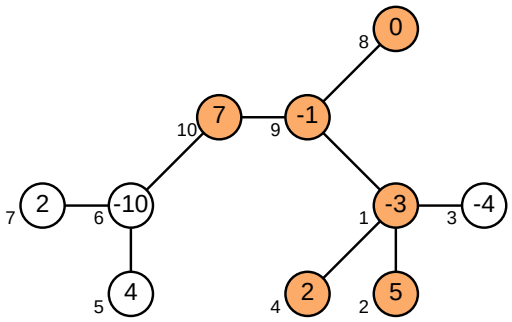

Figure 1: Sample Input 1

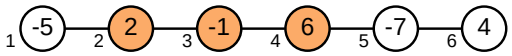

Figure 2: Sample Input 2

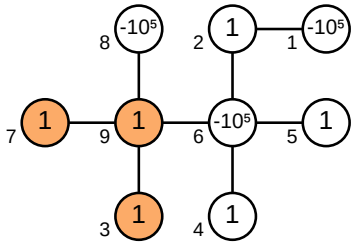

Figure 3: Sample Input 3

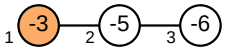

Figure 4: Sample Input 4