Problem D. DFS Score

Time limit 1000 ms
Memory limit 256MB

Problem Description

You are the royal scribe of the Tree Kingdom. The kingdom's great genealogy is a rooted tree of n nodes, with node 1 as the root. Each node i has a value w_i.

When performing a depth-first search (DFS) from the root, each node is visited for the first time at some moment p_i, which is `DFS order` — the position where it first appears in the traversal sequence.

Your task is to determine how to choose the visiting order of children during DFS so that the total score

$$\sum_{i=1}^{n} p_i w_i$$

is maximized.

Input format

The first line contains a single integer n ($1 \leq n \leq 2 \times 10^5$) - the number of nodes in tree.

The second line contains n integers $w_1,\ w_2,\ \ldots,\ w_n$ ($1 \leq w_i \leq 10^8$), where w_i is the value of node i.

The third line contains $n-1$ integers $f_2,\ f_3,\ \ldots,\ f_n$ ($1 \leq f_i \leq n$), where f_i denotes the parent of node i.

Output format

Print a single integer - the maximum possible value of $\sum_{i=1}^{n} p_i w_i$, where p_i is the position of node i in the DFS visiting order.

Subtask score

Subtask	Score	Additional Constraints
0	0	Sample testcases
1	3	$n \leq 10$
2	23	$\forall\ 2 \leq i \leq n,\ f_i = 1$
3	29	The given tree is a binary tree
4	45	No additional constraints

Sample

Sample Input 1

```
5
1 2 3 4 5
1 1 1 1
```

Sample Output 1

```
55
```

Sample Input 2

```
6
1 3 3 2 10 6
1 1 2 2 3
```

Sample Output 2

```
107
```