F - 01 on Tree

Editorial (/contests/agc023/tasks/agc023_f/editorial)

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Time Limit: 2 sec / Memory Limit: 256 MB

Score : 1700 points

Problem Statement

Snuke has a rooted tree with N vertices, numbered 1 through N. Vertex 1 is the root of the tree, and the parent of Vertex i ($2 \leq i \leq N$) is Vertex P_i ($P_i < i$). There is a number, 0 or 1, written on each vertex. The number written on Vertex i is V_i.

Snuke would like to arrange the vertices of this tree in a horizontal row. Here, for every vertex, there should be no ancestor of that vertex to the right of that vertex.

After arranging the vertices, let X be the sequence obtained by reading the numbers written on the vertices from left to right in the arrangement. Snuke would like to minimize the inversion number of X. Find the minimum possible inversion number of X.

Notes

The *inversion number* of a sequence Z whose length N is the number of pairs of integers i and j ($1 \leq i < j \leq N$) such that $Z_i > Z_j$.

Constraints

- $1 \leq N \leq 2 \times 10^5$
- $1 \leq P_i < i$ ($2 \leq i \leq N$)
- $0 \leq V_i \leq 1$ ($1 \leq i \leq N$)

- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{array}{llll}
N & & & \\
P_2 & P_3 & \ldots & P_N \\
V_1 & V_2 & \ldots & V_N
\end{array}
$$

Output

Print the minimum possible inversion number of X.

Sample Input 1 Copy

Copy

```
6
1 1 2 3 3
0 1 1 0 0 0
```

Sample Output 1 Copy

Copy

```
4
```

When the vertices are arranged in the order $1, 3, 5, 6, 2, 4$, X will be $(0, 1, 0, 0, 1, 0)$, whose inversion number is 4. It is impossible to have fewer inversions, so the answer is 4.

Sample Input 2 Copy

Copy

```
1

0
```

Sample Output 2 Copy

Copy

```
0
```

$X = (0)$, whose inversion number is 0.

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Sample Input 3 Copy

```
15
1 2 3 2 5 6 2 2 9 10 1 12 13 12
1 1 1 0 1 1 0 0 1 0 0 1 1 0 0
```

Copy

Sample Output 3 Copy

```
31
```

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