D. Appleman and Tree

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Appleman has a tree with n vertices. Some of the vertices (at least one) are colored black and other vertices are colored white.

Consider a set consisting of k $(0 \le k < n)$ edges of Appleman's tree. If Appleman deletes these edges from the tree, then it will split into $(k+1)$ parts. Note, that each part will be a tree with colored vertices.

Now Appleman wonders, what is the number of sets splitting the tree in such a way that each resulting part will have exactly one black vertex? Find this number modulo 1000000007 $(10^9 + 7)$.

Input

The first line contains an integer n $(2 \le n \le 10^5)$ — the number of tree vertices.

The second line contains the description of the tree: $n - 1$ integers $p_0, p_1, ..., p_{n-2}$ $(0 \le p_i \le i)$. Where p_i means that there is an edge connecting vertex $(i+1)$ of the tree and vertex p_i. Consider tree vertices are numbered from 0 to $n - 1$.

The third line contains the description of the colors of the vertices: n integers $x_0, x_1, ..., x_{n-1}$ (x_i is either 0 or 1). If x_i is equal to 1, vertex i is colored black. Otherwise, vertex i is colored white.

Output

Output a single integer — the number of ways to split the tree modulo 1000000007 $(10^9 + 7)$.

Examples

input

```
3
0 0
0 1 1
```

output

```
2
```

input

```
6
0 1 1 0 4
1 1 0 0 1 0
```

output

```
1
```

input

```
10
0 1 2 1 4 4 4 0 8
0 0 0 1 0 1 1 0 0 1
```

output

```
27
```