

Problem E



MEMORY LIMIT
1024 MB



CPU TIME LIMIT
4 seconds



DIFFICULTY
Not Available

LINKS

No links available

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Sample data files

SOURCE & LICENSE

ICPC North America
Regional Contests
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x_j for all

$$1 \leq i < j \leq k.$$

Compute two quantities for the given tree:

- The length L of the longest jumping path where the labels of the vertices are nondecreasing. That is, $u_{a_i} \leq u_{a_j}$ for all $1 \leq i < j \leq L$.
- The number M of jumping paths of length L where the labels of the vertices are nondecreasing. Since this number may be large, give the remainder of M when divided by the prime 11 092 019.

Input

The first line of input contains an integer N denoting the number of vertices in the tree ($1 \leq N \leq 10^6$).

This is followed by N lines of input indicating the labels u_1 through u_N . Each label is an integer in the range $[0, 10^6]$.

The remaining $N - 1$ lines describe the tree structure. Skipping the root (which has no parent) and starting with $i = 2$, line i gives the parent $p_i < i$ of vertex v_i .

Output

Print a single line of output with two integers separated by a space. The first integer is L , and the second integer is M modulo the prime 11 092 019.

Sample Input 1

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



Sample Output 1

```
5 1
```



Sample Input 2

```
5
4
3
2
1
0
1
2
3
4
```



Sample Output 2

```
1 5
```



Sample Input 3

```
4
1
5
3
6
1
2
3
```



Sample Output 3

```
3 2
```



Sample Input 4

```
6
1
2
3
4
5
6
1
1
1
1
1
```



Sample Output 4

```
2 5
```



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