

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,  $u_{a_i} \leq u_{a_i}$  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

# Sample Output 1

5		٦
3		
3		
3		
3		
3		
1		
2		
3		
4		

5 1

## Sample Input 2

### Sample Output 2



1 5

# Sample Input 3

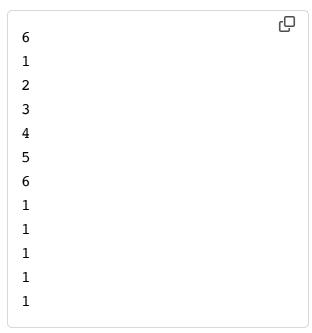
# Sample Output 3

4	G
1	
5	
3	
6	
1	
2	
3	

3 2

## Sample Input 4

## Sample Output 4



2 5

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