The Dilworth Tree

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

You are given a tree consisting of n vertices numbered from 1 to n, *rooted at* 1 (see notes for more clarification on the convention of rooted trees).

We say that a vertex u is an *ancestor* of vertex v if u exists on the simple (shortest) path from v to the root (which is the vertex numbered 1).

We say that a set of vertices is *dilworthy* if no vertex is an ancestor of the other. More formally, a set S is *dilworthy* if and only if for any $u, v \in S$ where $u \neq v$, we have that u is NOT an ancestor of v.

Find the maximum size of a dilworthy set in the given tree, and find the number of such sets modulo $10^9 + 7$. (Two sets of vertices are different if there exists one vertex in one of them that is not in the other).

Input

The first line of input contains an integer t ($1 \leq t \leq 10^4$), the number of test cases.

The first line of each test case contains an integer n ($2 \leq n \leq 10^5$), the number of vertices in the tree.

The second line of each test case contains $n-1$ integers $p_2, p_3, \ldots, p_n$ ($1 \leq p_i < i$), where p_i is the parent of the ith vertex.

The sum of n over all test cases doesn't exceed $5 \cdot 10^5$.

Output

For each test case, output one line containing two integers, the maximum size of a dilworthy set, and the number of dilworthy sets of maximum size modulo $10^9 + 7$.

Example

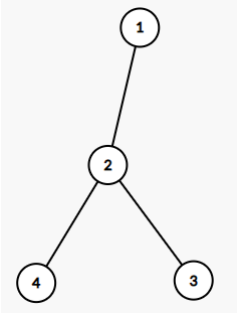
standard input	standard output
4 4 1 2 2 5 1 2 1 4 10 1 1 2 2 3 3 7 8 6 4 1 2 3	2 1 2 4 4 6 1 4

Note

A *tree* is a connected undirected graph without cycles. A *rooted tree* is a tree with a selected vertex, which is called the *root*.

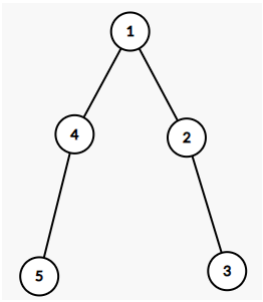
The tree is specified by an array of parents p containing n numbers: p_i is a parent of the vertex with the index i. The *parent* of a vertex u is a vertex that is the next vertex on the shortest path from u to the root.

In the first test case, the tree looks like this:



Here, the maximum size of a dilworthy set is 2, and there is only one dilworthy set of size 2: $\{3, 4\}$.

In the second test case, the tree looks like this:



Here, the maximum size of a dilworthy set is 2, and there are 4 dilworthy sets of size 2: $\{2, 4\}, \{2, 5\}, \{3, 4\}, \{3, 5\}$.