Unstable town

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

BTtown consists of n houses, numbered from 1 to n. House locations are described with a permutation $p_1, \ldots, p_n$: houses i and p_i are considered neighboring. If $p_i = i$, it means the i-th house has no neighbors.

Technical issues at the city's central power station compelled the city government to cut houses from the electric power grid one by one. Let's say the order of cuts is described by the permutation $q_1, \ldots, q_n$. Initially, every house is connected to the power grid. During i-th day the house numbered q_i is disconnected from the grid.

To ease the situation, citizens will be obliged to help their neighbors in need: the residents of the houses still connected to the grid will need to run cables to the neighboring houses that had been cut from the grid. It should be mentioned, that this will NOT lead to the connection of the neighboring house back to the grid.

At any moment in time, the following will hold:

- A cable runs between two houses if and only if they are neighbors and only one of them is connected to the power grid.
- Therefore, if both houses are cut from the grid, the cables that might have run between the houses before are removed.

At the end of each day, the city will be divided into groups of houses connected by citizen-run cables. To analyze the power grid stability, it is important to keep track of the number of such groups. *Instability* of the cut order q is the sum of numbers of such groups over each of n days.

The city government has not yet decided on the ordering q and it is necessary to find the sum of instabilities over all possible orderings. Help the city calculate the value modulo $10^9 + 7$.

Input

The first line of the input contains one integer n ($1 \le n \le 10^6$).

The second line contains n space-separated integers $p_1, \ldots, p_n$ ($1 \le p_i \le n$, $p_i \ne p_j$ if $i \ne j$).

Output

Print one integer – the remainder of division of the sum of instabilities over all possible cut orderings by $10^9 + 7$.

Scoring

This problem contains 7 subtasks, that meet following requirements:

1. $n \le 8$. Worth 8 points
2. $n \le 18$. Worth 10 points.
3. $n \le 30$. Worth 13 points.
4. $n \le 2000$. Worth 22 points.
5. $n \le 100000$, $p_i = n - i + 1$. Worth 16 points.
6. $n \le 100000$. Worth 12 points.

7. Original problem constraints. Worth 19 points.

Examples

standard input	standard output
2 2 1	6
4 3 4 2 1	232

Note

Let's consider the second example with ordering $q = [4, 3, 2, 1]$. Initially, all houses are connected to the grid.

1. During the first day the 4-th house is cut from the grid. Residents of houses 1 and 2 will notice that their neighbor has no electricity and will run the cables. Thus houses 1, 2, 4 will form a group connected by citizen-run cables. At the same time, the 3-rd house will be considered a separate group. The number of groups is 2.
2. During the second day the 3-rd house will be cut from the grid. Residents of houses 1 and 2 will again run the cables. All 4 houses will be connected by cables. The number of groups is 1.
3. On the third day the 2-nd house is disconnected. As a result, both cables previously attached to the 2-nd house are removed. Now there are two groups — $[1, 3, 4]$ and $[2]$. The number of groups is 2.
4. Finally, the first house is disconnected. Both cables previously attached to the first house are removed and every house will form a separate group. The number of groups is 4.

As a result, the *instability* of the ordering $q = [4, 3, 2, 1]$ is 2+1+2+4=9.