Problem D. Minimum Suffix

Input file: standard input
Output file: standard output

For a string s of length n, we define $p_j = x$ if $s[x \dots j]$ is the minimum suffix of $s[1 \dots j]$, for all $j = 1, \dots, n$. (A suffix is the minimum suffix of a string if it is lexicographically smaller than any other suffix of that string.)

You are to recover s from $p_1, \dots, p_n$. If there are multiple answers, find the lexicographically smallest one.

Input

The first line contains a single integer T ($1 \le T \le 10^5$) representing the number of test cases.

For each test case, the first line contains a single integer n ($1 \le n \le 3 \times 10^6$) representing the length of s. The next line contains n integers $p_1, \dots, p_n$ ($1 \le p_i \le i$ for all $1 \le i \le n$).

It is guaranteed that the sum of n over all test cases does not exceed 3×10^6.

Output

For each test case, output one line. If there is no solution, output -1. Otherwise, output the lexicographically smallest s. Characters of s are represented by positive integers. Smaller integers represent smaller characters in the lexicographical order.

Example

standard input	standard output
6 3 1 1 1 3 1 1 2 3 1 1 3 3 1 2 1 3 1 2 2 3 1 2 3	1 2 2 -1 1 2 1 1 1 2 2 1 2 1 1 1

Note

As the input/output can be huge, it is recommended to use fast input/output methods.