

Minimum Suffix

Input file: **standard input**
Output file: **standard output**
Time limit: **3 seconds**
Memory limit: **1024 megabytes**

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 ($1 \leq T \leq 10^5$) representing the number of test cases.

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

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	1 2 2
3	-1
1 1 1	1 2 1
3	1 1 2
1 1 2	2 1 2
3	1 1 1
1 1 3	
3	
1 2 1	
3	
1 2 2	
3	
1 2 3	

Note

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