

## Problem D. Scoring Subsequences

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**Time limit** 2500 ms

**Mem limit** 262144 kB

The *score* of a sequence  $[s_1, s_2, \dots, s_d]$  is defined as  $\frac{s_1 \cdot s_2 \cdot \dots \cdot s_d}{d!}$ , where  $d! = 1 \cdot 2 \cdot \dots \cdot d$ . In particular, the score of an empty sequence is 1.

For a sequence  $[s_1, s_2, \dots, s_d]$ , let  $m$  be the maximum score among all its subsequences. Its *cost* is defined as the maximum length of a subsequence with a score of  $m$ .

You are given a **non-decreasing** sequence  $[a_1, a_2, \dots, a_n]$  of integers of length  $n$ . In other words, the condition  $a_1 \leq a_2 \leq \dots \leq a_n$  is satisfied. For each  $k = 1, 2, \dots, n$ , find the cost of the sequence  $[a_1, a_2, \dots, a_k]$ .

A sequence  $x$  is a subsequence of a sequence  $y$  if  $x$  can be obtained from  $y$  by deletion of several (possibly, zero or all) elements.

### Input

Each test contains multiple test cases. The first line contains the number of test cases  $t$  ( $1 \leq t \leq 10^4$ ). The description of the test cases follows.

The first line of each test case contains an integer  $n$  ( $1 \leq n \leq 10^5$ ) — the length of the given sequence.

The second line of each test case contains  $n$  integers  $a_1, a_2, \dots, a_n$  ( $1 \leq a_i \leq n$ ) — the given sequence. It is guaranteed that its elements are in non-decreasing order.

It is guaranteed that the sum of  $n$  over all test cases does not exceed  $5 \cdot 10^5$ .

### Output

For each test case, output  $n$  integers — the costs of sequences  $[a_1, a_2, \dots, a_k]$  in ascending order of  $k$ .

### Sample 1

Input	Output
3 3 1 2 3 2 1 1 5 5 5 5 5 5	1 1 2 1 1 1 2 3 4 5

**Note**

In the first test case:

- The maximum score among the subsequences of  $[1]$  is 1. The subsequences  $[1]$  and  $[\ ]$  (the empty sequence) are the only ones with this score. Thus, the cost of  $[1]$  is 1.
- The maximum score among the subsequences of  $[1, 2]$  is 2. The only subsequence with this score is  $[2]$ . Thus, the cost of  $[1, 2]$  is 1.
- The maximum score among the subsequences of  $[1, 2, 3]$  is 3. The subsequences  $[2, 3]$  and  $[3]$  are the only ones with this score. Thus, the cost of  $[1, 2, 3]$  is 2.

Therefore, the answer to this case is 1 1 2, which are the costs of  $[1]$ ,  $[1, 2]$  and  $[1, 2, 3]$  in this order.