Problem D. Scoring Subsequences

Time limit 2500 ms
Mem limit 262144 kB

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

For a sequence $[s_1, s_2, \ldots, s_d]$, 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 $[a_1, a_2, \ldots, a_n]$ of integers of length n. In other words, the condition $a_1 \le a_2 \le \ldots \le a_n$ is satisfied. For each $k = 1, 2, \ldots, n$, find the cost of the sequence $[a_1, a_2, \ldots, a_k]$.

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 ($1 \le t \le 10^4$). The description of the test cases follows.

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

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) — 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 $[a_1, a_2, \ldots, a_k]$ 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.