One Permutation

Input file:	*standard input*
Output file:	*standard output*
Time limit:	4 seconds
Memory limit:	1024 mebibytes

You are given one permutation p of length n. For a continuous subsegment of p, define its cost as the length of the longest increasing subsequence of this subsegment. For a partition of p into disjoint subsegments, define its cost as the sum of the costs of these subsegments.

Define a_k as the maximum cost among partitions of p into k non-empty disjoint subsegments.

You need to find a_k for each k from 1 to n.

Input

The input contains several test cases. The first line contains a single integer t ($1 \le t \le 10^3$), the number of test cases. 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 second line contains n different integers $p_1, p_2, \ldots, p_n$ ($1 \le p_i \le n$). Together, they define a permutation of $1, 2, \ldots, n$.

The sum of n over all test cases does not exceed 10^5.

Output

For each test case, print $a_1, a_2, \ldots, a_n$ in one line.

Example

standard input	*standard output*
5 5 1 2 3 4 5 5 5 4 3 2 1 8 2 4 1 3 6 5 8 7 9 3 2 1 6 5 4 9 8 7 1 1	5 5 5 5 5 1 2 3 4 5 4 6 7 8 8 8 8 8 3 4 5 6 7 8 9 9 9 1

Note

Consider the third test case with the permutation $p = [2, 4, 1, 3, 6, 5, 8, 7]$:

- For $k = 1$, the answer is just the length of the longest increasing subsequence in p, which is $a_1 = 4$.
- For $k = 2$, the partition into $[2, 4]$ and $[1, 3, 6, 5, 8, 7]$ has the maximum cost: $a_2 = 2 + 4 = 6$.
- For $k = 3$, the partition into $[2, 4]$, $[1, 3, 6]$, and $[5, 8, 7]$ has the maximum cost: $a_3 = 2 + 3 + 2 = 7$.
- For $k = 4$, the partition into $[2, 4]$, $[1, 3, 6]$, $[5, 8]$, and $[7]$ has the maximum cost: $a_4 = 2+3+2+1 = 8$.
- For $k > 4$, it is easy to see that $a_k = 8$.