Task - Kick Start 07/07/22, 00:25

Coding Practice with Kick Start Session #1 - Kick Start 2022 H-index

PROBLEM ANALYSIS

Problem

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Jorge is a physicist who has published many research papers and wants to know how much impact they have had in the academic community. To measure impact, he has developed a metric, H-index, to score each of his papers based on the number of times it has been cited by other papers. Specifically, the H-index score of a researcher is the largest integer \mathbf{H} such that the researcher has \mathbf{H} papers with at least \mathbf{H} citations each.

Jorge has written ${\bf N}$ papers in his lifetime. The i-th paper has ${\bf C_i}$ citations. Each paper was written sequentially in the order provided, and the number of citations that each paper has will never change. Please help Jorge determine his H-index score after each paper he wrote.

Input

The first line of the input gives the number of test cases, T. T test cases follow. Each test case begins with a line containing N, the number of papers Jorge wrote. The second line contains N integers. The i-th integer is C_i , the number of citations that the i-th paper has.

Output

For each test case, output one line containing Case #x: y, where x is the test case number (starting from 1) and y is a space-separated list of $\mathbf N$ integers. The i-th integer is Jorge's H-index score after writing his i-th paper.

Limits

Time limit: 50 seconds.

Memory limit: 1 GB.

$$1 \le \mathbf{T} \le 100$$

1<

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 $1 \le C_i \le 10^\circ$

Test Set 1

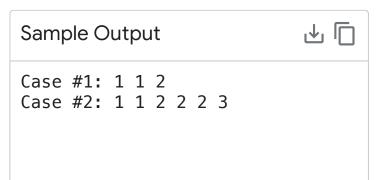
 $1 \leq \mathbf{N} \leq 1000$

Test Set 2

 $1 < N < 10^5$.

Sample





The input contains 2 test cases. In Sample Case #1, Jorge wrote $\mathbf N$ = 3 papers.

- After the 1st paper, Jorge's *H-index* score is 1, since he has 1 paper with at least 1 citation.
- After the 2nd paper, Jorge's H-index score is still 1.
- After the 3rd paper, Jorge's H-index score is 2, since he has 2 papers with at least 2 citations (the 1st and 3rd papers).

In Sample Case #2, Jorge wrote N = 6 papers.

- After the 1st paper, Jorge's H-index score is 1, since he has 1 paper with at least 1 citation.
- After the 2nd paper, Jorge's H-index score is still 1.
- After the 3rd paper, Jorge's H-index score is 2, since he has 2 papers with at least 2 citations (the 2nd and 3rd papers).
- After the 4th paper, Jorge's H-index score is still 2.
- After the 5th paper, Jorge's H-index score is still 2.
- After the 6th paper, Jorge's H-index score is 3, since he has 3 papers with at least 3 citations (the 2nd, 3rd and 6th papers).