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

PROBLEM ANALYSIS

#### **Problem**

# Download the Starter Code!

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 H such that the researcher has H papers with at least H citations each.

Jorge has written  $\mathbf N$  papers in his lifetime. The i-th paper has  $\mathbf C_i$  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,  $\mathbf{T}$ .  $\mathbf{T}$  test cases follow. Each test case begins with a line containing  $\mathbf{N}$ , the number of papers Jorge wrote. The second line contains  $\mathbf{N}$  integers. The i-th integer is  $\mathbf{C}_i$ , 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  $\mathbb N$  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.

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

 $1 \le \mathbf{C_i} \le 10^5$ 

Test Set 1

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

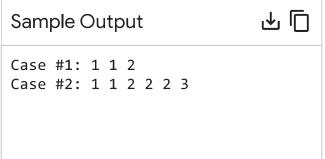
Test Set 2

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$$1 < N < 10^5$$
.

# Sample

Sample Input	<b>♣</b> □	
2 3 5 1 2 6 1 3 3 2 2 15		



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).