

- (1) You are given an array of N elements. Each element can be very large ($\leq 10^9$). For every prefix of the array, print the number of distinct elements.

Your program must have time complexity of $O(N \log N)$.

Sample Input

6
1 3 1 2 100 100

Sample Output

1 2 2 3 4 4

Explanation:

The prefixes and the number of distinct elements are as follows:

[1] : 1
[1, 3] : 2
[1, 3, 1] : 2
[1, 3, 1, 2] : 3
[1, 3, 1, 2, 100] : 4
[1, 3, 1, 2, 100, 100] : 4

- (2) You have two arrays. The elements in each array are large ($\leq 10^9$) and distinct. Find the elements that occur in both arrays. **Your program must have time complexity of $O(N \log N)$.**

Sample Input

6
200 100 1000 10000 100000
7
100 2 3 200 100000 30 40

Sample Output

200 100 100000

Explanation:

A = [200, 100, 1000, 10000, 100000]

B = [100, 2, 3, 200, 100000, 30, 40]

Common elements are shown in bold above. [200, 100, 100000]

- (3) There are N numbers on the whiteboard. You do the following until there are at least two numbers on the board.

- (a) At first you pick the smallest two numbers
- (b) Then you erase them from the board
- (c) Finally you write the sum of those numbers on the board

Print which numbers are erased at each step.

Your program's time complexity must be $O(N\log N)$.

Sample Input

6
3 7 2 7 3 3

Sample Output

2 3
3 3
5 6
7 7
11 14

Explanation:

Initial Numbers = [3, 7, 2, 7, 3, 3]

On the 1st step, you erase 2, 3 and add $2+3 = 5$ on the board.
The board looks like, [7, 7, 3, 3, 5]

On the 2nd step, you erase 3, 3 and add $3+3 = 6$ on the board.
The board looks like, [7, 7, 5, 6]

On the 3rd step, you erase 5, 6 and add $5+6 = 11$ on the board.
The board looks like, [7, 7, 11]

On the 4th step, you erase 7, 7 and add $7+7 = 14$ on the board.
The board looks like, [11, 14]

On the 5th step, you erase 11, 14 and add $11+14 = 25$ on the board.
The board looks like, [25]

(4) You have a list of N movies. You know the durations of those movies in minutes. You want to watch **at most two different movies** but do not want to spend more than T minutes. Can you find what is the maximum time in minutes you can spend watching movies ? **You can assume that all the durations are distinct.**

Your program must have $O(N\log N)$ time complexity.

First line contains N and T .

Then in the next line, there are N integers denoting the duration of the movies.

Sample Input

Sample Output

5 100

50 74 40 75 10

90

Explanation: You have 100 minutes to watch movies. The best option is to watch movies with duration 50 and 40.