

Project - Divide and Conquer

Use divide and conquer to solve the following problems. Please write your code with method provided. Please write your codes in C language. Zip all the files into one submission with your last name as the name of the zip file to be uploaded.

1. Find the contiguous sub array which has the largest sum and return its sum. This array may contain negative numbers.

```
int maxSubArray(int[] nums){  
  
}
```

2. Find the kth largest number in an unsorted array.

```
int findKthLargest(int[] nums, int k){  
  
}
```

3. Find the missing number from a given array. Your array will be in form [n, n+c, n+2c, ...].

```
int findMissNo(int[] nums){  
  
}
```

4. Find number of rotations in a circularly sorted array. For example, given an array [4, 6, 8, 1, 2, 3], your program should return 3. Given array [1, 2, 3, 4, 6, 8], your program should return 0.

```
int findRotationNo(int[] nums){  
  
}
```

5. You are given **N** number of books. Every **i**th book has **P** number of pages. You have to allocate books to **M** number of students. There can be many ways or permutations to do so. In each permutation one of the **M** students will be allocated the maximum number of pages. Out of all these permutations, **the task** is to find that particular permutation in which **the maximum number of pages allocated to a student is minimum of those in all the other permutations, and print this minimum value.**

Each book will be allocated to exactly one student. Each student has to be allocated atleast one book.

Note: Return **-1** if a valid assignment is not possible, and **allotment should be in contiguous order (see explanation for better understanding).**

Input:

The first line contains 'T' denoting the number of testcases. Then follows description of T testcases:

Each case begins with a single positive integer N denoting the number of books.

The second line contains N space separated positive integers denoting the pages of each book.

And the third line contains another integer M, denoting the number of students.

Output:

For each test case, output a single line containing minimum number of pages each student has to read for corresponding test case.

Constraints:

$1 \leq T \leq 100$

$1 \leq N \leq 10^6$

$1 \leq A[i] \leq 10^6$

$1 \leq M \leq 10^6$

Example:

Input:

1

4

12 34 67 90

2

Output:

113

Explanation: Allocation can be done in following ways:

{12} and {34, 67, 90} Maximum Pages = 191

{12, 34} and {67, 90} Maximum Pages = 157

{12, 34, 67} and {90} Maximum Pages = 113

Therefore, the minimum of these cases is 113, which is selected as output.