

ADSA-2022 Lab Assignment - 2 Duration: 3 Hrs (Time:2:15PM to 5:30PM)

INSTRUCTIONS

1. ALL Four PROBLEMS are COMPULSORY
2. Carefully read all assignment problems.
3. Write only a single main function. You can call the required functions from the main function. Print the list of elements wherever necessary.
4. Name the file as follows: **S2020xxxxx_A03.c**
5. DO NOT zip. Upload a single .c file directly to your submission in the common Google classroom.
6. **Don't share or copy the codes. If malpractice is found, you will be awarded Zero.**

QUESTION 1:

2-Points

You are running a library catalog. You know that the books in your collection are almost in sorted ascending order by title, with the exception of one book which is in the wrong place. You want the catalog to be completely sorted in ascending order. In this scenario, which of the following sorting algorithms takes minimum time and also write a c program for the problem with the chosen algorithm.

1. Insertion Sort
2. Merge Sort

Question-2

2-points

You have been given an array A of size N . You need to sort this array non-decreasing order using bubble sort. However, you do not need to print the sorted array. You just need to print the number of swaps required to sort this array using bubble sort

Input Format

The first line consists of a single integer N denoting the size of the array. The next line contains N space separated integers denoting the elements of the array.

Output Format

Print the required answer in a single line

Constraints

$$1 \leq N \leq 100$$

$$1 \leq A[i] \leq 100$$

Sample Input	Sample Output
5 1 2 3 4 5	0

QUESTION 3:

3-Points

Given an array A of N integers, classify it as being Good, Bad or Average. It is called Good if it contains exactly X distinct integers, Bad if it contains less than X distinct integers and Average if it contains more than X distinct integers.

Input Format

- First line consists of a single integer T denoting the number of test cases.
- First line of each test case consists of two space separated integers denoting N and X.
- Second line of each test case consists of N space separated integers denoting the array elements.

Output Format

Print the required answer for each test case on a new line.

Constraints

$$1 \leq T \leq 50$$

$$1 \leq X, N \leq 13000$$

$$1 \leq A[i] \leq 10^9$$

Sample Input	Sample Output
4 4 1 1 4 2 5 4 2 4 2 1 5 4 3 5 2 4 1 4 4 1 2 4 5	Average Average Average Good

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QUESTION 4:
3 Points

You are given a stack of N integers such that the first element represents the top of the stack and the last element represents the bottom of the stack. You need to pop at least one element from the stack. At any one moment, you can convert the stack into a queue. The bottom of the stack represents the front of the queue. You cannot convert the queue back into a stack. Your task is to remove exactly K elements such that the sum of the K removed elements is maximised.

Input format :

- The first line consists of two space-separated integers N and K.
- The second line consists of N space-separated integers denoting the elements of the stack.

Output format :

- Print the maximum possible sum of the K removed elements

Constraints

- $1 \leq N \leq 10^5$
- $1 \leq K \leq N$
- $1 \leq A_i \leq 10^9$

Sample Input	Sample Output
10 5 10 9 1 2 3 4 5 6 7 8	40