CSE 4202
Structured Programming II Lab

Lab No: 02
Name of the topic: Sorting (Bubble Sort, Sort Function, Comparator Function)

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1.1 Task 1:

You will be given the size of a non negative integer array, n in the first line of input. Then you will be given the array elements in the next line of input. Your task is to print "Yes" if the array is already sorted otherwise print "No" and the sorted array. Use Bubble sort to do so.
Sample Input:
6
3 4 1 4 5 2
3
1 2 3
Sample Output:
No
1 2 3 4 4 5
Yes

1.2 Task 2:

Coders here is a simple task for you, you have given an array of size N and an integer M. Your task is to calculate the difference between maximum sum and minimum sum of N-M elements of the given array.
Input:
First line contains an integer T denoting the number of testcases. First line of every testcase contains two integer N and M. Next line contains N space separated integers denoting the elements of array.
Output:
For every test case print your answer in new line.
Constraints:
1<=t<=10
1<=n<=1000
1<=a[i]<=1000
N.B: You MUST solve this with by **Bubble Sort** instead of using sort function.
Sample Input:
1
5 1
1 2 3 4 5
Sample Output:
4
Explanation:
M is 1 and N is 5 so you have to calculate maximum and minimum sum using (5-1 =) 4 elements. Maximum sum using the 4 elements would be (2+3+4+5=)14. Minimum sum using the 4 elements would be (1+2+3+4=)10. Difference will be 14-10=4.

1.3 Task 3:

You are given an array A of non-negative integers of size m. Your task is to sort the array in non-decreasing order and print out the original indices of the new sorted array.
Example:
A=4,5,3,7,1
After sorting the new array becomes A=1,3,4,5,7.

The required output should be "4 2 0 1 3"
Input:
The first line of input consists of the size of the array.
The next line consists of the array of size m.
Output:
Output consists of a single line of integers.
Constraints:
1<=m<=10^6
0<=A[i]<= 10^6
NOTE: The indexing of the array starts with 0.
Sample Input:
5
4 5 3 7 1
Sample Output:
4 2 0 1 3

1.4 Task 4:

The Monster University Olympiad Programmers Training Center (MU OPTC) has n students. For each student you know the number of times he/she has participated in the ACM ICPC world programming championship. According to the ACM ICPC rules, each person can participate in the world championship at most 5 times.

The head of the MU OPTC is recently gathering teams to participate in the world championship. Each team must consist of exactly three people, at that, any person cannot be a member of two or more teams. What maximum number of teams can the head make if he wants each team to participate in the world championship with the same members at least k times?
Input:
The first line contains two integers, n and k (1<=n<=2000; 1<=k<=5).
The next line contains n integers: y_1,y_2,...,y_n (1<= y_i<=5)., where y_i shows the number of times the i-th person participated in the ACM ICPC world championship.
Output:
Print a single number — the answer to the problem.
Sample Input:
5 2
0 4 5 1 0
6 4
0 1 2 3 4 5
6 5
0 0 0 0 0 0
Sample Output:
1
0
2
Explanation:
In the first sample only one team could be made: the first, the fourth and the fifth participants.
In the second sample no teams could be created.
In the third sample two teams could be created. Any partition into two teams fits.

1.5 Task 5:

The names and marks of n students in different subjects (Data Structures, Networking and Machine Learning) are given. The task is to compute total marks and ranks of all students. And finally display all students sorted by rank.
Rank of student is computed using below rules.

1. If total marks are different, then students with higher marks gets better rank.
2. If total marks are same, then students with higher marks in Machine Learning gets better rank.
3. If total marks are same and marks in Machine Learning are also same, then students with better marks in Data Structures gets better rank.
4. If all marks (total, Machine Learning, Data Structures and Networking) are same, then any student can be assigned better rank.

Input: In the first line of input you will be given n, the number of students. In the next n lines of input you will be given student name, marks in Machine Learning, Data Structures and Networking respectively.
Output:
You have to print the sorted ranks of the students along with their marks.

Sample Input:
5
Bryan 80 95 85
Howie 80 80 80
Andrew 80 70 90
Kevin 95 85 99
Nick 95 85 80
Sample Output:
1 Kevin
2 Nick
3 Bryan
4 Howie
5 Andrew