School of Engineering
Jawaharlal Nehru University
B. Tech. (2nd Semester)
Subject: Data Structure

Instructions:

1. **You are advised to use Google Document to write your program.**
2. **Write your document name as (Branch_RollNumber_Lab_1) [Example: CS_01_Lab_1]**
3. **Each program should start with new page.**
4. **At least four Test Cases should be provided with each program.**
5. **Plagiarised content (program) will be penalised.**
6. **Submit the assignment on time (request for date extension will not be entertained)**
7. **Check the linked Sample Copy for further clarification. https://docs.google.com/document/d/1TfnEi_MgEwByxG_9Ez_s51Ss_GYh_5G6FBA0KoFh_j8/edit?usp=sharing**

Lab Assignment No. 5

1. **In a data structure class, there are 'n' no. of students (n<50), who appeared for a surprise quiz in the lecture. The course instructor has stored marks in an array. After that, he realized that he forgot to store the marks of Mr. X. Write a program to take input of all the marks from the user, and a function to insert the marks of X at the position defined by the user into the array.**

   Input:
   Enter number of students: 5
   Enter Marks of each student: 25
   67
   98
   47
   56
   Enter the Marks of X: 19
   Enter position: 5
   Output:
   25 67 98 47 19 56

2. **In IT industry employees' ids are generated randomly and stored in ascending order. Vidhan is the new employee. Write a program to keep the record of the Id of the newly admitted employee such that the order remains maintained.**
   Input:
   Enter number of records: 6
   Enter Ids of all 6 Employee (In ascending order): 201
   898
   1004
   1123

1211
1220
Enter the Id of newly admitted Employee: 1101
Output:
After Insertion: 201 898 1004 1101 1123 1211 1220

3. **There are eight students in a class and their obtained marks in Data structure are stored in an array named Mark. A student can obtain a minimum of 0 and a maximum of 100 marks. Find the number of students who got greater than the average marks.**

Sample Test Case
Input
Enter the marks: 10.5 20 8 45 90.5 1 56 74
Output
4

Input
Enter the marks: 80.5 97 23.75 68 74 91 66.5 77
Output
5

Input
Enter the marks: 44.75 33 78 65 90 99.5 13 76.75
Output
5

4. **Two integers X and Y are given. Your task is to find out the ordered pairs (x,y) such that**

$$1 \leq x < y < X$$

and

$$(Y \bmod x) \bmod y = (Y \bmod y) \bmod x$$

Input: (1) The first line consists of an integer value that denotes the number of test cases.
(2) The only line of each test cases consists of two integers X and Y.

Sample Input
2
2 4
3 6
Output
1
3

Explanation:
There are only one pair satisfying the condition.
$1 \leq 1 < 2 < 2$ (Given X=2, Chosen x=1, y=2)
(Given Y=4) (4 mod 1) mod 2 = (4 mod 2) mod 1

The only order pair is: (1,2)

There are three pairs satisfying the condition.
$1 \leq 1 < 2 < 3$ (Given X=3, Chosen x=1, y=2)

(Given Y=6) (6 mod 1) mod 2 = (6 mod 2) mod 1

$1 \leq 1 < 3 < 3$ (Given X=3, Chosen x=1, y=3)
(Given Y=6) (6 mod 1) mod 3 = (6 mod 3) mod 1

$1 \leq 2 < 3 < 3$ (Given X=3, Chosen x=2, y=3)
(Given Y=6) (6 mod 2) mod 3 = (6 mod 3) mod 2

The only order pair is: (1,2), (1,3), (2,3)

5. **Write a program to implement queue and perform operations like insert and delete numbers. (assume queue size of 5).**