

OJ Assignment-3

Problem Statement 1:

Given two positive integers a and b , find the number of armstrong numbers between a and b inclusive. Please consider the below definition of the armstrong number for solving this problem :

“An Armstrong number is a number such that the sum of its digits raised to the third power is equal to the number itself.”

Input Format:

First line specifies t, the number of test cases. The next t lines contain two positive integers a and b.

Output Format:

In each of the next t lines, print the number of armstrong numbers between a and b.

Constraints:

$$1 \leq t \leq 100$$

$$1 \leq a, b \leq 1000$$

Sample input:

```
2
1 1
153 155
```

Sample output:

```
1
1
```

Problem Statement 2:

Given n, a non-negative binary number convert it to decimal number. The binary number 'n' will be given in integer format. It is ensured that the binary number can be stored in an integer variable.

Input Format:

The first line contains t, which specifies the number of test cases. Each of the next t lines contains a single non-negative integer.

Output Format:

The next t lines contain the decimal form of the number entered.

Constraints:

$0 \leq n \leq 10^{18}$

(HINT : Use 'long long int')

Sample Input:

```
4
0
1100
10
111
```

Sample Output:

```
0
12
2
7
```

Problem Statement 3:

In the given array of n unique elements, find the minimum element and maximum element. Then print the elements between the minimum and maximum element inclusively.

Input Format:

First line specifies the number of test cases t. In each of the next t test cases, first line contains n representing the number of elements and second line contains the list of n elements.

Output Format:

For each test case, output the elements between minimum and maximum number in a single line as illustrated in sample output.

Constraints:

$$1 \leq t \leq 100$$

$$1 \leq n \leq 10000$$

Sample Input:

```
2
4
1 2 3 4
5
2 3 1 5 7
```

Sample Output:

```
1 2 3 4
1 5 7
```

Problem Statement 4:

Given an array A of **n** elements. Find the count of the number of pairs (A[i], A[j]), such that $i < j$ and the **sum** of two elements in the pair is greater than **k**.

Input Format:

The first line specifies the number of test cases 't'. For each of the test case , the first line consists of two space separated integers 'n' and 'k' and the second line consists of 'n' elements of array separated by a space character.

Output Format:

For each test case , the output is a single number specifying the count of such pairs (as specified in problem statement).

Constraints:

$1 \leq t \leq 100$
 $1 \leq n \leq 100$
 $-10e9 \leq A[i] \leq 10e9$

Sample Input:

```
3
1 -6
-5
3 3
3 4 -5
4 3
-3 2 8 7
```

Sample Output:

```
0
1
5
```

Problem Statement 5:

Given a string , reverse it and print it. You can't use inbuilt functions.

Input Format:

First line specifies t, the number of test cases. Each of the next t lines contains a string.

Output Format:

For each test case, print the reversed string in a new line.

Constraints:

$1 \leq t \leq 100$

$1 \leq \text{length of string} \leq 5000$

String can contain whitespace characters except newline character '\n'.

Sample Input:

```
2
Shjah
Abc cdb
```

Sample Output:

```
hajhS
bdc cbA
```

Problem Statement 6

Given an array of n numbers, you need to find the sum of the subarray with maximum sum. Ensure that your subarray is contiguous. Please note that your subarray with maximum sum can be an empty subarray (subarray size = 0).

Input Format:

The first line specifies 't', the number of test case. The next 't' test cases consist of two lines. The first line of each test case specifies 'n' (number of elements of the array) and second line of each test case consists of 'n' numbers separated by a single space character.

Output Format:

The output of each test case should be in a new line and should consist of a single integer which specifies the maximum contiguous subarray sum.

Constraints:

$$1 < t < 1000$$

$$1 < n < 100$$

$$-10e10 < \text{Sum}(A[0], A[1], \dots, A[n-1], A[n]) < 10e10$$

(HINT: Use 'long int' or 'long long int')

Sample Input:

```
3
1
-1
4
-1 4 -3 32
5
-1 6 -3 4 -1
```

Sample Output:

```
0
32
7
```

Problem Statement 7:

Some students from UG-1 are very fond of playing with big numbers. They are wondering how to do sum of two big whole numbers n and m as it would be very cumbersome for them to add digit by digit on their own. Please help them to do sum of these two big numbers.

Input Format:

First line specifies t, the number of test cases. Each of the next t lines contains two space separated non-negative big integers n and m.

Output Format:

For each test case, print the sum of two big integers n and m.

Constraints:

 $1 \leq t \leq 1000$
$$0 \leq n, m \leq 10^{1000}$$

No extra zeroes will be there in big numbers at both ends. For example, there will be no input cases like '000001111111'.

Sample Input:

2

[illegible][illegible]

Sample Output:

222

[illegible]

Problem Statement 8:

Given an array of n integers, arrange them in non-decreasing order using **bubble sort**. Scores will be re-evaluated based on usage of bubble sort. Use of any other sorting technique will make your submission invalid.

Input Format:

First line specifies t , the number of test cases. Each of the next t test cases contains a number n in the first line and the second line contains n space separated integers.

Output Format:

For each test case, print the n numbers in non-decreasing order as illustrated in the sample test cases.

Constraints:

$$1 \leq t \leq 100$$

$$1 \leq n \leq 500$$

Sample Input:

```
2
5
3 4 2 3 4 5
3
2 1 1
```

Sample Output:

```
2 3 4 5 3 4
1 1 2
```


Problem Statement 9

Given a matrix A of size $m \times n$, find its transpose (A^T)

Input Format:

First line contains t which specifies the number of test cases. Each of the next 't' test cases describes the input format. First line of each test case contains two positive integers 'm' and 'n', where 'm' is number of rows of the matrix and 'n' is number of columns of the matrix. The next 'm' lines are used for specifying the $m \times n$ matrix.

Output Format:

For each of the t test cases, output the transpose of matrix A.

Constraints:

$$1 \leq t \leq 100$$

$$-10000 \leq A_i \leq 10000$$

Sample input:

```
1
4 5
1 1 7 1 5
1 1 1 1 3
2 1 1 1 2
1 6 3 1 11
```

Sample output:

```
1 1 2 1
1 1 1 6
7 1 1 3
1 1 1 1
5 3 2 11
```

Problem Statement 10

Find the multiplication of two matrices of size 4X4.

Sample Input:

First line contains t which specifies the number of test cases. Each of the next 't' test cases contains two matrices A and B of size 4X4 as illustrated in the sample input.

Sample Output:

For each of the t test cases, output the multiplication of matrix A and B.

Constraints:

$$1 \leq t \leq 100$$

$$-10000 \leq A_i \leq 10000$$

Sample input:

```
1
1 1 1 1
1 1 1 1
1 1 1 1
1 1 1 1
2 2 2 2
2 2 2 2
2 2 2 2
2 2 2 2
```

Sample output:

```
8 8 8 8
8 8 8 8
8 8 8 8
8 8 8 8
```

Bonus Question :

Prathyush went to Cafe Coffee Day. The cafe contains N boxes with pasteries enumerated from 1 to N and are placed in a circle in clockwise order (boxes 1 and N are adjacent). Each box has unlimited amount of pastries with a tastyness level of A_i . Pratyush is very greedy. He is only interested in magic boxes. According to him magic boxes are described like :

- He picks a box i and stays in front of it.
- Now he eats food from box i and **skips** next A_i boxes.
- Now he is staying at some other (probably even the same!) box and repeats.
- Box i is a magic box if at some point of such game started from box i , he will find himself staying in front of it again.

When Prathyush came home, his other friends asked him about how many magic boxes were in the cafe? Help Prathyush to in finding that!

Input Format

The first line of the input contains an integer T denoting the number of test cases. The description of T test cases follows.

The first line of each test case contains a single integer N denoting the number of boxes.

The second line contains N space-separated integers A_1, A_2, \dots, A_N denoting the tastyness levels of each box.

Output Format

For each test case, output a single line containing number of magical boxes.

Constraints

- $0 \leq A_i \leq 10^9$
- $1 \leq \text{sum of all } N \text{ over all the test cases} \leq 10^4; 1 \leq N \leq 1000$

Sample Input:

```
3
4
1 1 1 1
4
3 0 0 0
4
0 0 0 2
```

Sample Output:

4
1
2

Explanation

Example case 1.

Here are Prathush's paths if he starting from each the box:

1 ->3 ->1

2 ->4 ->2

3 ->1 ->3

4 ->2 ->4

As you see, all 4 boxes are magical.

Example case 2.

Here are Pratyush's paths if he starts from each box appropriately:

1 ->1

2 ->3 ->4 ->1 ->1

3 ->4 ->1 ->1

4 ->1 ->1

AS you see, only box 1 is magical.