

Advanced Programming Techniques in Health Care

Health Care IT

WS 2018

Small C/C++ Examples

2. Assignment

(Deadline: 2018-11-26 20:00)

Example 1 A jail has N prisoners, and each prisoner has a unique id number, S , ranging from 1 to N . There are sweets that must be distributed to the prisoners.

The jailer decides the fairest way to do this is by sitting the prisoners down in a circle (ordered by ascending S), and then, starting with some random S , distribute one candy at a time to each sequentially numbered prisoner until all M candies are distributed. For example, if the jailer picks prisoner $S=2$, then his distribution order would be $(2,3,4,5,\dots,N-1,N,1,2,3,\dots)$ until all M sweets are distributed.

But wait - there's a catch - the very last sweet is poisoned! Can you find and print the ID number of the last prisoner to receive a sweet so he can be warned?

Input Format

The first line contains an integer, T , denoting the number of test cases. The T subsequent lines each contain 3 space-separated integers: N (the number of prisoners), M (the number of sweets), and S (the prisoner ID), respectively.

Constraints

- $1 \leq T \leq 100$
- $1 \leq N \leq 10^9$
- $1 \leq M \leq 10^9$
- $1 \leq S \leq N$

Output Format

For each test case, print the ID number of the prisoner who receives the poisoned sweet on a new line.

Sample Input 1

```
2
5 2 1
5 2 2
```

Sample Output 1

```
2
3
```

Example 2

We define the following:

- A subarray of an n-element array is an array composed from a contiguous block of the original array's elements. For example, if `array=[1,2,3]`, then the subarrays are `[1]`, `[2]`, `[3]`, `[1,2]`, `[2,3]`, and `[1,2,3]`. Something like `[1,3]` would not be a subarray as it is not a contiguous subsection of the original array.
- The sum of an array is the total sum of its elements.
 - An array's sum is negative if the total sum of its elements is negative.
 - An array's sum is positive if the total sum of its elements is positive.

Given an array of n integers, find and print its number of negative subarrays on a new line.

Input Format

The first line contains a single integer, n, denoting the length of array $A = [a_0, a_1, \dots, a_{n-1}]$. The second line contains n space-separated integers describing each respective element, a_i , in array A.

Constraints

- $1 \leq n \leq 100$
- $-10^4 \leq a_i \leq 10^4$

Output Format

Print the number of subarrays of A having negative sums.

Sample Input

```
5
1 -2 4 -5 1
```

Sample Output

```
9
```

Explanation

There are nine negative subarrays of $A = [1, -2, 4, -5, 1]$:

1. $[-2] \rightarrow -2$
2. $[-5] \rightarrow -5$
3. $[1, -2] \rightarrow -1$
4. $[4, -5] \rightarrow -1$
5. $[-5, 1] \rightarrow -4$
6. $[-2, 4, -5] \rightarrow -3$
7. $[1, -2, 4, -5] \rightarrow -2$
8. $[-2, 4, -5, 1] \rightarrow -2$
9. $[1, -2, 4, -5, 1] \rightarrow -1$

Thus, we print 9 on a new line.