

# Happy Subarrays

## Problem

Let us define  $F(B, L, R)$  as the sum of a subarray of an array  $B$  bounded by indices  $L$  and  $R$  (both inclusive). Formally,  $F(B, L, R) = B_L + B_{L+1} + \dots + B_R$ .

An array  $C$  of length  $K$  is called a happy array if all the prefix sums of  $C$  are non-negative. Formally, the terms  $F(C, 1, 1), F(C, 1, 2), \dots, F(C, 1, K)$  are all non-negative.

Given an array  $\mathbf{A}$  of  $\mathbf{N}$  integers, find the result of adding the sums of all the happy subarrays in the array  $\mathbf{A}$ .

## Input

The first line of the input gives the number of test cases,  $\mathbf{T}$ .  $\mathbf{T}$  test cases follow. Each test case begins with one line consisting an integer  $\mathbf{N}$  denoting the number of integers in the input array  $\mathbf{A}$ . Then the next line contains  $\mathbf{N}$  integers  $\mathbf{A}_1, \mathbf{A}_2, \dots, \mathbf{A}_\mathbf{N}$  representing the integers in given input array  $\mathbf{A}$ .

## Output

For each test case, output one line containing `Case #x: y`, where  $x$  is the test case number (starting from 1) and  $y$  is the result of adding the sums of all happy subarrays in the given input array  $\mathbf{A}$ .

## Limits

Time limit: 25 seconds.

Memory limit: 1 GB.

$1 \leq \mathbf{T} \leq 100$ .

$-800 \leq \mathbf{A}_i \leq 800$ , for all  $i$ .

### Test Set 1

$1 \leq \mathbf{N} \leq 200$ .

### Test Set 2

For at most 30 cases:

$1 \leq \mathbf{N} \leq 4 \times 10^5$ .

For the remaining cases:

$1 \leq \mathbf{N} \leq 200$ .

## Sample

Sample Input

Sample Output

```
2
5
1 -2 3 -2 4
3
1 0 3
```

```
Case #1: 14
Case #2: 12
```

In Sample Case #1, the happy subarrays are  $[1]$ ,  $[3]$ ,  $[3, -2]$ ,  $[3, -2, 4]$ , and  $[4]$  with their respective sums 1, 3, 1, 5, and 4. After adding the sums obtained, the result is 14.

In Sample Case #2, the happy subarrays are  $[1]$ ,  $[1, 0]$ ,  $[1, 0, 3]$ ,  $[0]$ ,  $[0, 3]$ , and  $[3]$  with their respective sums 1, 1, 4, 0, 3, and 3. After adding the sums obtained, the result is 12.