

Bits and Coins

ZPRAC-16-17-Lab6

[40 points]

Up next in Rohan's and Bhuvish's list is Nirbhay. They know how much Nirbhay loves Bitcoins, the digital currency. So much so that he writes up a random array of N numbers daily on his computer, in which is hidden a part of the number of bitcoins he has in his possession. Rohan and Bhuvish, curious as they are, decide to hack into his system, see these daily strings, and find out how rich their friend is.

The number of bitcoins indicated by this array of N integers is given by the sum of the number of STRICTLY INCREASING SUBARRAYS and the number of STRICTLY DECREASING SUBARRAYS in it. Let us explain these terms a bit -

1) Given an array S , a subarray is the array $S[i], S[i+1], S[i+2], \dots, S[j]$ where i and j such that $0 \leq i < j < N$ where N is the length of array S . For example, if $S = [1, 2, 3, 4]$, its subarrays are $[1, 2], [2, 3], [3, 4], [1, 2, 3], [2, 3, 4], [1, 2, 3, 4]$.

2) A strictly increasing subarray has all its elements following a strictly increasing order. For example, if $S = [1, 2, 2, 4]$, its strictly increasing subarrays are - $[1, 2]$ and $[2, 4]$ only.

3) A strictly decreasing subarray has all its elements following a strictly decreasing order. For example, if $S = [2, 2, 4, 2]$, it has only one strictly decreasing subarray $[4, 2]$

As was mentioned before, the number of bitcoins in this array written by Nirbhay is given by the sum of the number of STRICTLY INCREASING SUBARRAYS and the number of STRICTLY DECREASING SUBARRAYS in the array. For example, for $S = [1, 2, 4, 2]$, the number of bitcoins are $3 + 1 = 4$. Bhuvish and Rohan want you to write a program to automate this, so they can get the grand total of Nirbhay's wealth quickly.

The input consists of two lines. The first line contains the integer N , the number of integers in Nirbhay's array. The second line contains N space separated integers.

The output should contain a single line consisting of the answer, i.e. the number of STRICTLY INCREASING SUBARRAYS in the given input array.

IMPORTANT NOTE : Implementing the simple technique (pick every subarray and check if it is strictly increasing/decreasing) won't pass all the test-cases, and even if it does, it probably

won't be given any marks. Try thinking of a more efficient solution

Constraints:

$1 \leq N \leq 50000$

Every integer of the array will fit inside an 'int' data-type. It can be positive as well as negative.

Example:

Input:

5

1 2 5 3 4

Output:

5

Explanation:

The Strictly Increasing Subarrays are [1,2,5], [1,2], [2,5], [3,4]

The Strictly Decreasing Subarrays are [5,3]