

CS2710 - Programming and Data Structures Lab

Lab Session - 1

Aug 4, 2021

Instructions

- This lab is ungraded. You are expected to solve ALL the three problems on repl.it using C++.
 - The questions are based on your training in programming in CS1111. So no additional inputs are needed, except the changes needed to switch from C to C++.
 - You are expected to solve each problem on your own. If you need assistance, ask your TA, not your classmate.
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Problems to be solved in lab

1. Given an array of integers, print the **number of magic** elements in the array. A *magic* element is an element in the array which is less than all the elements to its left in the array. The first element of the array, that is element indexed at 0 is not magic by definition. The array may also contain duplicates.

Input format : First line of the input contains a single integer N (≥ 2), denoting the size of the array. Next line contains N space separated integers like 10 21 34 23 53.

Example :

Input :

5

6 9 12 4 1

Output :

2

Explanation :

For the array $\{6,9,12,4,1\}$, the magic elements are 4 and 1, because they are less than every element to their left. Hence there are two numbers which are magic numbers and the output is 2.

Constraints :

$1 \leq N \leq 200$

Input	Output
10 30 100 120 -40 87 -30 5 20 -10 -50	2
15 450 348 301 247 232 211 172 95 0 -7 -23 -121 -234 -319 -415	14

- In this question the input, output and goal are exactly the same as Question 1. The test cases are also exactly the same. However, you are expected to write code which is "efficient". While solving Question 1, you are free to use nested loops. However to earn the two marks in this question, you have to solve Question 1 **without** using nested loops. One idea for doing so is to maintain the **minimum** value for elements ranging from 0 to i and use the minimum value while processing element i+1. If you have already coded Question 1 without using nested loops then there is nothing to be done for you in Question 2.
- Given an array of integers, print the number of sub arrays whose product is divisible by 5. A sub array is a contiguous part of the original array.

Input format : First line of the input contains a single integer N (≥ 2), denoting the size of the array. Next line contains N space separated integers like 10 21 34 23 53.

Example :

Input :

3
1 2 5

Output :

3

Explanation : For the array {1,2,5}, the sub arrays are {1}, {1,2}, {1,2,5}, {2}, {2,5}, {5}. Of these sub arrays, the ones which have product divisible by 5 are {1,2,5}, {2,5} and {5}. Hence the output is 3.

Constraints :

$2 \leq N \leq 15$

$0 \leq i < N$

$-15 \leq arr[i] \leq 15$

Input	Output
10 -2 -1 7 6 3 -3 9 4 -4 5	10
12 13 -9 11 -7 4 -3 -1 7 1 5 -5 -13	32
15 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10	120