## international collegiate programming contest ASIA REGIONAL CONTEST

## **ICPC JAKARTA 2022**



# Problem G The Only Mode

You are given an array of integers A of size N (indexed from 1 to N) where  $A_i$  is either 0, 1, 2, or 3.

A subarray  $\langle l, r \rangle$  of A is defined as  $[A_l, A_{l+1}, \cdots, A_r]$ , and its size is r - l + 1.

A value x is the *only mode* of a subarray  $\langle l, r \rangle$  if and only if x appears **strictly** more often than other values in subarray  $\langle l, r \rangle$ .

Your task in this problem is to find, for each  $x \in \{0, 1, 2, 3\}$ , the size of the longest subarray of A such that x is the only mode of that subarray, or determine if x cannot be the only mode in any subarray.

## Input

Input begins with an integer N ( $1 \le N \le 100\,000$ ) representing the size of array A. The next line contains N integers  $A_i$  ( $A_i \in \{0, 1, 2, 3\}$ ).

### Output

Output four space-separated integers in a single line. Each integer represents the answer where x is 0, 1, 2, and 3, respectively. For each value of x, if there exists a subarray such that x is the only mode in that subarray, then output the size of the longest subarray; otherwise, output 0.

### Sample Input #1

7 1 2 2 0 3 0 3

## Sample Output #1

4 1 5 3

Explanation for the sample input/output #1

- The longest subarray such that 0 is the only mode is (3,6) of length 4, i.e. [2,0,3,0].
- The longest subarray such that 1 is the only mode is  $\langle 1, 1 \rangle$  of length 1, i.e. [1].
- The longest subarray such that 2 is the only mode is  $\langle 1, 5 \rangle$  of length 5, i.e. [1, 2, 2, 0, 3].
- The longest subarray such that 3 is the only mode is  $\langle 5, 7 \rangle$  of length 3, i.e. [3, 0, 3].

#### Sample Input #2

12 2 0 1 0 2 1 1 0 2 3 3 3



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## Sample Output #2

4 9 1 9

Explanation for the sample input/output #2

- The longest subarray such that 0 is the only mode is  $\langle 1, 4 \rangle$  or  $\langle 2, 5 \rangle$ .
- The longest subarray such that 1 is the only mode is  $\langle 3, 11 \rangle$ .
- The longest subarray such that 2 is the only mode is  $\langle 1, 1 \rangle$ ,  $\langle 5, 5 \rangle$ , or  $\langle 9, 9 \rangle$ .
- The longest subarray such that 3 is the only mode is  $\langle 4, 12 \rangle$ .

## Sample Input #3

2 0 2

## Sample Output #3

1 0 1 0

Explanation for the sample input/output #3

The longest subarray such that 0 or 2 is the only mode contains only a single element by itself; on the other hand, there is no subarray such that 1 or 3 is the only mode.

## Sample Input #4

12 3 0 2 2 1 0 2 1 3 3 2 3

## Sample Output #4

1 5 11 8