Pan African Olympiad in Informatics Team Selection Test 2025

Stubborn Alpacas

Time limit: 2 seconds **Memory limit: 512 MB**

Farmer John's N Alpacas are always wandering off to the far reaches of the farm! He needs your help herding them back together. The main field in the farm is long and skinny – we can think of it as a number line, on which an Alpaca can occupy any integer location. The N Alpacas are currently situated at distinct integer locations, and Farmer John wants to move them so they occupy consecutive locations (e.g., positions 3, 4, 5, 6, 7, and 8).

Unfortunately, the Alpacas are rather stubborn, and Farmer John has trouble getting their attention to make them move. At any point in time, he can only make an Alpaca move if it its position is an extremum of the list of positions (either the minimum or maximum position among all the Alpacas). When he moves an Alpaca, he can instruct it to move to any unoccupied integer location as long as this new location is not an extremum. Observe that over time, these types of moves tend to push the Alpacas closer and closer together. Determine the minimum and maximum number of moves possible before the Alpacas become grouped in N consecutive locations.

Problem Description

You are given an array A of N integers. Determine both the minimum (referred to as C_{min}) and maximum (referred to as C_{max}) amount of moves needed to place all Alpacas in each of the $A[i]$ $(0 \leq i < N)$ positions along a consecutive strip of the integer number line, knowing that you can only displace an Alpaca if its position is an extremum (minimum or maximum) of the array, and only to a position where it is no longer an extremum.

Input

Input is formatted as follows:

```
N
A[0] A[1] A[2] ...  A[N-1]
```

Output

Output is expected as follows:

```
Cmin
Cmax
```

Constraints

- $3 \leq N \leq 10^5$
- $1 \leq A[i] \leq 10^9$ $(0 \leq i < N)$

Subtasks

For this task, the amount of points you are awarded is the maximum of the percentages of testcases correctly answered across all of your submissions. This means that if this task has t testcases and you have answered at most s $(s \leq t)$ testcases correctly across all of your submissions, the amount of points you are awarded will be $100 * \frac{s}{t}$.

Example

```
3
7 4 9
```

Output:

```
1
2
```

Explanation

The minimum amount of moves is 1: all you need to do is move the Alpaca in position 4 to position 8, which sets up the three Alpacas like so: $7 - 8 - 9$. The maximum amount of moves is 2: If you move the Alpaca in position 9 to position 6, and the Alpaca in position 7 to position 5, you set up the Alpacas consecutively like so: $4 - 5 - 6$.