Kick Start 2020 - Round E

Longest Arithmetic

Problem

An arithmetic array is an array that contains at least two integers and the differences between consecutive integers are equal. For example, [9, 10], [3, 3, 3], and [9, 7, 5, 3] are arithmetic arrays, while [1, 3, 3, 7], [2, 1, 2], and [1, 2, 4] are not arithmetic arrays.

Sarasvati has an array of **N** non-negative integers. The i-th integer of the array is $\mathbf{A_i}$. She wants to choose a contiguous arithmetic subarray from her array that has the maximum length. Please help her to determine the length of the longest contiguous arithmetic subarray.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the integer **N**. The second line contains **N** integers. The i-th integer is $\mathbf{A_i}$.

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 length of the longest contiguous arithmetic subarray.

Limits

Time limit: 20 seconds.
Memory limit: 1 GB.
$1 \leq \mathbf{T} \leq 100$.
$0 \leq \mathbf{A_i} \leq 10^9$.

Test Set 1

$2 \leq \mathbf{N} \leq 2000$.

Test Set 2

$2 \leq \mathbf{N} \leq 2 \times 10^5$ for at most 10 test cases.
For the remaining cases, $2 \leq \mathbf{N} \leq 2000$.

Sample

Sample Input

```
4
7
10 7 4 6 8 10 11
4
9 7 5 3
```

Sample Output

```
Case #1: 4
Case #2: 4
Case #3: 3
Case #4: 6
```

```
9
5 5 4 5 5 5 4 5 6
10
5 4 3 2 1 2 3 4 5 6
```

In Sample Case #1, the integers inside the bracket in the following represent the longest contiguous arithmetic subarray: 10 7 [4 6 8 10] 11

In Sample Case #2, the whole array is an arithmetic array, thus the longest contiguous arithmetic subarray is the whole array.

In Sample Case #3, the longest contiguous arithmetic subarray is either [5, 5, 5] (a subarray from the fourth integer to the sixth integer) or [4, 5, 6] (a subarray from the seventh integer to the ninth integer).

In Sample Case #4, the longest contiguous arithmetic subarray is the last six integers.