Arrays Challenge-Record Breaker
(Google kickstart)

Problem

Isyana is given the number of visitors at her local theme park on **N** consecutive days. The number of visitors on the i-th day is V_i. A day is *record breaking* if it satisfies both of the following conditions:

- The number of visitors on the day is strictly larger than the number of visitors on each of the previous days.
- Either it is the last day, or the number of visitors on the day is strictly larger than the number of visitors on the following day.

Note that the very first day could be a record breaking day!

Please help Isyana find out the number of record breaking days.

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 V_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 number of record breaking days.

Constraints

Time limit: 20 seconds per test set.

Memory limit: 1GB.

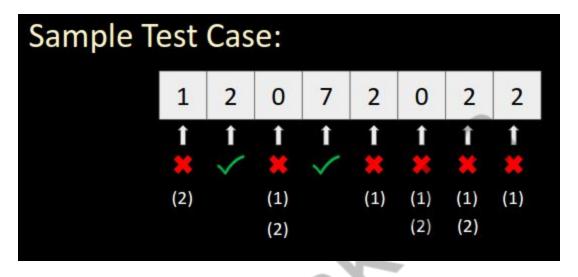$1 \le T \le 100$.

$0 \le V_i \le 2 \times 10^5$.

Test set 1

$1 \le N \le 1000$.

Test set 2

$1 \le N \le 2 \times 10^5$ for at most 10 test cases.

For the remaining cases, $1 \le N \le 1000$.

Solution
Constraints Analysis

$$1 \text{ sec} = 10^8 \text{ operations}$$
$$20 \text{ sec} = 2 \times 10^9 \text{ operations}$$

Brute Force Approach
Iterate over all the elements and check if it is record breaking day or not.

Note: To check if a[i] is a record breaking day, we have to iterate over a[0], a[1],...., a[i-1].

Time complexity for this operation: O(n)
Overall Time Complexity: O(n²)

Optimised Approach

Intuition: If we can optimise step (1), then we can optimise our overall solution.

For step (1): We need to check if a[i] > { a[i-1], a[i-2],..., a[0] }, which is same as

$$a[i] > max(a[i-1], a[i-2],..., a[0])$$

For this, we will keep a variable mx, which will store the maximum value till a[i].
Then we just need to check,

$$a[i] > mx$$
$$a[i] > a[i+1] , \{ if \ i+1 < n \}$$
and update mx, mx = max(mx, a[i])

So step (1) time complexity reduces to O(1).

Overall time complexity: O(n)

Code

```cpp
void RecordBreakers()
{
    int n;
    cin >> n;
    int a[n+1];

    for(int i=0; i<n; i++)
    {
        cin >> a[i];
    }
    a[n] = -1;
    if(n == 1)
    {
        cout << "1" << endl;
        return;
    }
    int ans = 0;

    int mx=-1;

    for(int i=0; i<n; i++)
    {
        if(a[i]>mx && a[i]>a[i+1])
            ans++;
        mx = max(mx,a[i]);
    }
    cout << ans << endl;
}
```

Apni Kaksha