Question 3: Longest Bitonic Subsequence

Question Author: Classical

An array B, of length k, is called bitonic if there exist an element $B[i]$ such that $B[1] < B[2] < ... < B[i]$ and $B[i] > B[i+1] > B[i+2] > ... > B[k]$. Given an array $A[1...N]$, determine the length of the longest bitonic subsequence of A.

Input Format

The first line consists of a single integer, N, the number of elements in the array A. The second line will consist of N integers, $A[1]$ to $A[N]$ respectively. Moreover, $-10^9 \leq A[i] \leq 10^9$ for all $1 \leq i \leq N$.

Sample Input

```
8
3 2 1 2 3 3 2 4
```

Sample Output

```
4
```

Explanation

One possible bitonic subsequence of length 4 is $[1, 2, 3, 2]$

Constraints

Subtask 1: [61 Marks] $N \leq 10000$.

Subtask 2: [39 Marks] $N \leq 10^6$.