Training for IEEEXtreme

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1 Longest Continuous Subarray With Absolute Diff Less Than or Equal to Limit

Given an array of integers nums and an integer limit, return the size of the longest non-empty subarray such that the absolute difference between any two elements of this subarray is less than or equal to limit.

Example 1:

Input: nums = [8,2,4,7], limit = 4
Output: 2
Explanation: All subarrays are:
[8] with maximum absolute diff $|8 - 8| = 0 <= 4$.
$[8, 2]$ with maximum absolute diff $|8 - 2| = 6 > 4$.
$[8, 2, 4]$ with maximum absolute diff $|8 - 2| = 6 > 4$.
$[8, 2, 4, 7]$ with maximum absolute diff $|8 - 2| = 6 > 4$.
[2] with maximum absolute diff $|2 - 2| = 0 <= 4$.
$[2, 4]$ with maximum absolute diff $|2 - 4| = 2 <= 4$.
$[2, 4, 7]$ with maximum absolute diff $|2 - 7| = 5 > 4$.
[4] with maximum absolute diff $|4 - 4| = 0 <= 4$.
$[4, 7]$ with maximum absolute diff $|4 - 7| = 3 <= 4$.
[7] with maximum absolute diff $|7 - 7| = 0 <= 4$.
Therefore, the size of the longest subarray is 2.

2 Min Max Subarray

You should implement a function that takes as argument an array of N integers. Find the shortest subarray that contains at least one of the minimum and one of the maximum values and return its length.

Desired solution Solve this problem in O(N) with O(1) additional memory.

Test Case #1: 7
1 5 9 7 1 9 4
Output: 2

Test Case #2: 4
5 5 5 5
Output: 1

3 MEAN MAX

He has an array A of length N. He wants to divide the array A into two non-empty subsets P and Q such that the value of mean(P)+mean(Q) is as large as possible. (Note that each A_i must belong to either subset P or subset Q).

Help him find this maximum value of mean(P)+mean(Q).

The first line contains T - the number of test cases. Then the test cases follow. The first line of each test case contains an integer N - the size of the array A. The second line of each test case contains N space-separated integers A_1,A_2,...,A_N denoting the array A.

Test Case #1: 2
2
4 5
5
2 2 2 2 2

Output: 9.000000
4.000000