CSE 106
Online on Divide and Conquer and Greedy Algorithms

Time: 40 minutes

You are given an array of integers. A **monotonic triplet** is a sequence of three consecutive elements that are either strictly increasing or strictly decreasing. That is, for a subarray of three consecutive elements (a_i, a_{i+1}, a_{i+2}), it is monotonic if:

$$(a_i < a_{i+1} < a_{i+2}) \quad \text{or} \quad (a_i > a_{i+1} > a_{i+2})$$

Your task is to use a **divide and conquer** strategy to find the **first index** i of such a monotonic triplet in the array. If no such triplet exists, return -1.

Input:

- First line: an integer n ($3 \leq n \leq 10^5$) — the number of elements in the array.
- Second line: n space-separated integers — the array elements.

Output:

- A single integer — the first index i (0-based) such that (a_i, a_{i+1}, a_{i+2}) forms a monotonic triplet. If there is no such index, output -1.

Example 1

Input: 8 5 4 3 6 7 2 3 1	**Output:** 0
Explanation: The triplet (5, 4, 3) is strictly decreasing and starts at index 0.	

Example 2

Input: 7 1 1 2 2 2 1 1	**Output:** -1
Explanation: No strictly increasing or decreasing triplet exists in the array.	

Example 3

Input: 7 0 1 1 2 3 1 4	**Output:** 2
Explanation: The triplet starting at index 2 , (1,2,3) is strictly increasing.	