

## ARRAYS - Assignment

**Question 1:** Given an integer array nums, return true if any value appears at least twice in the array, and return false if every element is distinct.

Example 1:

Input: nums = [1, 2, 3, 1]

Output: true

Example 2:

Input: nums = [1, 2, 3, 4]

Output: false

Example 3:

Input: nums = [1, 1, 1, 3, 3, 4, 3, 2, 4, 2]

Output: true

Constraints:

- $1 \leq \text{nums.length} \leq 10^5$
- $-10^9 \leq \text{nums}[i] \leq 10^9$

**Question 2:** There is an integer array nums sorted in ascending order (with distinct values).

Prior to being passed to your function, nums is possibly rotated at an unknown pivot index  $k$  ( $1 \leq k < \text{nums.length}$ ) such that the resulting array is  $[\text{nums}[k], \text{nums}[k+1], \dots, \text{nums}[n-1], \text{nums}[0], \text{nums}[1], \dots, \text{nums}[k-1]]$  (0-indexed). For example,  $[0,1,2,4,5,6,7]$  might be rotated at pivot index 3 and become  $[4,5,6,7,0,1,2]$ .

Given the array nums after the possible rotation and an integer target, return *the index of target if it is in nums, or -1 if it is not in nums*.

You must write an algorithm with  $O(\log n)$  runtime complexity.

Example 1:

Input: nums = [4, 5, 6, 7, 0, 1, 2], target = 0

Output: 4

Example 2:

Input: nums = [4, 5, 6, 7, 0, 1, 2], target = 3

Output: -1

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Example 3:

Input: nums = [1], target = 0

Output: -1

Constraints:

- $1 \leq \text{nums.length} \leq 5000$
  - $-10^4 \leq \text{nums}[i] \leq 10^4$
  - All values of nums are unique.
  - nums is an ascending array that is possibly rotated.
  - $-10^4 \leq \text{target} \leq 10^4$
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**Question 3:** You are given an array prices where prices[i] is the price of a given stock on the  $i^{\text{th}}$  day.

Return the maximum profit you can achieve from this transaction. If you cannot achieve any profit, return 0.

Example 1:

Input: prices = [7, 1, 5, 3, 6, 4]

Output: 5

Explanation: Buy on day 2 (price = 1) and sell on day 5 (price = 6), profit = 6-1 = 5.

Note that buying on day 2 and selling on day 1 is not allowed because you must buy before you sell.

Example 2:

Input: Prices = [7, 6, 4, 3, 1]

Output: 0

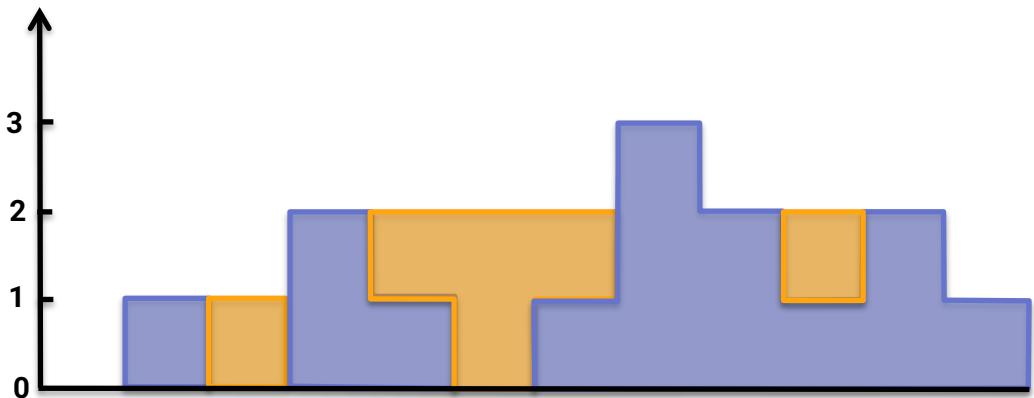
Explanation: In this case, no transactions are done and the max profit = 0.

Constraints:

- $1 \leq \text{prices.length} \leq 10^5$
  - $0 \leq \text{prices}[i] \leq 10^4$
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**Question 4:** Given  $n$  non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.



**Example 1:**

Input: height = [0, 1, 0, 2, 1, 0, 1, 3, 2, 1, 2, 1]

Output: 6

Explanation: The above elevation map (black section) is represented by array [0,1,0,2,1,0,1,3,2,1,2,1]. In this case, 6 units of rain water (blue section) are being trapped.

**Example 2:**

Input: height = [4, 2, 0, 3, 2, 5]

Output: 9

Constraints:

- $n == \text{height} . \text{length}$
  - $1 <= n <= 2 * 10^4$
  - $0 <= \text{height}[i] <= 10^5$
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**Question 5:** Given an integer array  $\text{nums}$ , return all the triplets  $[\text{nums}[i], \text{nums}[j], \text{nums}[k]]$  such that  $i \neq j$ ,  $i \neq k$ , and  $j \neq k$ , and  $\text{nums}[i] + \text{nums}[j] + \text{nums}[k] == 0$ . Notice that the solution set must not contain duplicate triplets.

**Example 1:**

Input: nums = [-1, 0, 1, 2, -1, -4]

Output: [[-1, -1, 2], [-1, 0, 1]]

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Example 2:

Input:    nums = [ ]

Output: [ ]

Example 3:

Input:    nums = [ 0 ]

Output: [ ]

Constraints:

- $0 \leq \text{nums} . \text{length} \leq 3000$
  - $-10^5 \leq \text{nums}[i] \leq 10^5$
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