

# 1. Remove Duplicates from Sorted Array

You are given a sorted array `nums`. Remove all duplicates **in-place** (i.e., without using another array) so that each element appears only once.

Return the new length of the array after removing duplicates.

Example:

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

**Output:** `[1, 2, 3, 4]` (new length = 4)

## 2. Longest Consecutive Sequence:

Given an unsorted array of integers, find the **length of the longest sequence of consecutive numbers** (numbers that appear one after another in order, not necessarily adjacent in the array).

Example:

**Input:** `nums = [100, 4, 200, 1, 3, 2]`

**Output:** 4

**Explanation:** The consecutive sequence is `[1, 2, 3, 4]`.

## 3. 3Sum (Find Triplets that Sum to Zero)

Find all unique triplets `(a, b, c)` in the array such that  $a + b + c = 0$ .

Example:

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

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

## 4. Move Zeroes

Move all zeros to the end of the array while keeping the order of non-zero elements **the same**.

Example:

**Input:** `nums = [0, 1, 0, 3, 12]`

**Output:** `[1, 3, 12, 0, 0]`

## 5. Majority Element

Find the element that appears **more than  $n/2$  times** in the array (it always exists).

Example:

**Input:** `nums = [2, 2, 1, 1, 1, 2, 2]`

**Output:** `2`

**Hint:** You can use the **Boyer–Moore Voting Algorithm**. Keep a candidate and a counter. Increase counter when the same element appears, decrease otherwise.

## 6. Subarray Sum Equals K

Given an array of integers `nums` and an integer `k`, count the total number of **continuous subarrays** whose sum equals `k`.

Example:

**Input:** `nums = [1, 1, 1], k = 2`

**Output:** `2`

**Explanation:** Subarrays `[1, 1]` (indices 0-1) and `[1, 1]` (indices 1-2) both sum to 2.

## 16. Longest Subarray with Sum $\leq K$

Find the **length** of the longest subarray whose sum is **less than or equal to K**.

**Example:**

**Input:** `nums = [2, -1, 2, 3, -4, 2], k = 3`

**Output:** `5`

**Explanation:** The longest subarray `[2, -1, 2, 3, -4]` has sum `2`.