题目来源 https://leetcode.com/problemset/algorithms/

1.Two Sum

Given an array of integers, return **indices** of the two numbers such that they add up to a specific target.

You may assume that each input would have ***exactly*** one solution.

Example:

```
Given nums = [2, 7, 11, 15], target = 9,

Because nums[0] + nums[1] = 2 + 7 = 9,
return [0, 1].
```

2.Median of Two Sorted Arrays

There are two sorted arrays **nums1** and **nums2** of size m and n respectively.

Find the median of the two sorted arrays. The overall run time complexity should be O(log (m+n)).

Example 1:

```
nums1 = [1, 3]
nums2 = [2]
The median is 2.0
```

Example 2:

```
nums1 = [1, 2]
nums2 = [3, 4]
The median is (2 + 3)/2 = 2.5
```

3.Remove Element

Given an array and a value, remove all instances of that value in place and return the new length.

Do not allocate extra space for another array, you must do this in place with constant memory.

The order of elements can be changed. It doesn't matter what you leave beyond the new length.

Example:

Given input array *nums* = `[3,2,2,3]`, *val* = `3`

Your function should return length = 2, with the first two elements of *nums* being 2.

4. Remove Duplicates from Sorted Array

Given a sorted array, remove the duplicates in place such that each element appear only *once* and return the new length.

Do not allocate extra space for another array, you must do this in place with constant memory.

For example,

Given input array *nums* = `[1,1,2]`,

Your function should return length = `2`, with the first two elements of *nums* being `1` and `2` respectively. It doesn't matter what you leave beyond the new length

5. Remove Duplicates from Sorted Array II

Follow up for "Remove Duplicates":

What if duplicates are allowed at most *twice*?

For example,

Given sorted array *nums* = `[1,1,1,2,2,3]`,

Your function should return length = `5`, with the first five elements of *nums* being `1`, `1`, `2`, `2` and `3`. It doesn't matter what you leave beyond the new length.

6. Find All Numbers Disappeared in an Array

Given an array of integers where 1 ≤ a[i] ≤ *n* (*n* = size of array), some elements appear twice and others appear once.

Find all the elements of [1, *n*] inclusive that do not appear in this array.

Could you do it without extra space and in O(*n*) runtime? You may assume the returned list does not count as extra space.

Example:

```
Input:
[4,3,2,7,8,2,3,1]

Output:
[5,6]
```

7. Max Consecutive Ones

Given a binary array, find the maximum number of consecutive 1s in this array.

```
Input: [1,1,0,1,1,1]
Output: 3
Explanation: The first two digits or the last three digits are consecutive 1s.
    The maximum number of consecutive 1s is 3.
```

Note:

- The input array will only contain `0` and `1`.
- The length of input array is a positive integer and will not exceed 10,000

8. Find All Duplicates in an Array

Given an array of integers, 1 ≤ a[i] ≤ *n* (*n* = size of array), some elements appear **twice** and others appear **once**.

Find all the elements that appear **twice** in this array.

Could you do it without extra space and in O(*n*) runtime?

Example:

```
Input:
[4,3,2,7,8,2,3,1]

Output:
[2,3]
```

9. Third Maximum Number

Given a **non-empty** array of integers, return the **third** maximum number in this array. If it does not exist, return the maximum number. The time complexity must be in O(n).

Example 1:

```
Input: [3, 2, 1]

Output: 1

Explanation: The third maximum is 1.
```

Example 2:

```
Input: [1, 2]
```

```
Output: 2

Explanation: The third maximum does not exist, so the maximum (2) is returned instead.
```

Example 3:

```
Input: [2, 2, 3, 1]

Output: 1

Explanation: Note that the third maximum here means the third maximum distinct number.
Both numbers with value 2 are both considered as second maximum.
```