1. Maximum Subarray

Given an integer array nums, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.

Example:

Input: [-2,1,-3,4,-1,2,1,-5,4],

Output: 6

Explanation: [4,-1,2,1] has the largest sum = 6.

Follow up:

If you have figured out the O(n) solution, try coding another solution using the divide and conquer approach, which is more subtle.

1. Largest Rectangle in Histogram

Given n non-negative integers representing the histogram's bar height where the width of each bar is 1, find the area of largest rectangle in the histogram.

Above is a histogram where width of each bar is 1, given height = [2,1,5,6,2,3].

The largest rectangle is shown in the shaded area, which has area = 10 unit.

1. Best Time to Buy and Sell Stock

Say you have an array for which the ith element is the price of a given stock on

If you were only permitted to complete at most one transaction (ie, buy one and sell one share of the stock), design an algorithm to find the maximum profit.

Note that you cannot sell a stock before you buy one.

Example 1:

Input : [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.

Not 7-1 = 6 as selling price needs to be larger than buying price.

Example 2:

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

Output: 0

Explanation : in this case, no transaction is done, i.e. max profit = 0.

4. House Robber

You are a professional robber planning to rob houses along a street. Each house has a certain amount of money stashed, the only constraint stopping you from robbing each of them is that adjacent houses have security system connected and it will automatically contact the police if two adjacent houses were broken into on the same night.

Given a list of non-negative integers representing the amount of money of each house, determine the maximum amount of money you can rob tonight without alerting the police.

Example 1:

Input: [1,2,3,1]

Output: 4

Explanation: Rob house 1 (money = 1) and then rob house 3 (money = 3).

Total amount you can rob = 1 + 3 = 4.

Example 2:

Input: [2,7,9,3,1]

Output: 12

Explanation: Rob house 1 (money = 2), rob house 3 (money = 9) and rob house 5

(money = 1).

Total amount you can rob = 2 + 9 + 1 = 12.

5.Maximal Square

Given a 20 binary matrix filled with O's and I's, find the largest square containing only 1's and return its area.

Example:

Input

1 0 1 0 0

1 0 1 1 1

1 1 1 1 1

1 0 0 1 0

Output: 4

6. Maximum Subarray

Given an integer array nums, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.

Example:

Input: [-2,1,-3,4,-1,2,1,-5,4],

Output: 6

Explanation: [4,-1,2,1] has the largest sum = 6.

Follow up:

If you have figured out the O(n) solution, try coding another solution using the divide and conquer approach, which is more subtle.

7. Climbing Stairs

You are climbing a stair case. It takes n steps to reach to the top.

Each time you can either climb 1 or 2 steps. In how many distinct ways can you climb to the top?

Note: Given n will be a positive integer.

Example 1:

Input: 2

Output: 2

Explanation. There are two ways to climb to the top.

1.1 step + 1 step

2. 2 steps

Example 2

Input : 3

Output: 3

Explanation: There are three ways to climb to the top

1. 1 step + 1 step + 1 step

2. 1 step + 2 steps

3. 2 steps + 1 step

8. Permutations

Given a collection of distinct integers, return all possible permutations.

Example:

Input: [1,2,3]

Output:

[

[1,2,3],

[1,3,2],

[2,1,3],

[2,3,1],

[3,1,2],

[3,2,1]

]

9. Sort Colors

Given an array with n objects colored red, white or blue, sort them in-place so that objects of the same color are adjacent, with the colors in the order red, white and blue.

Here, we will use the integers 0, 1, and 2 to represent the color red, white, and blue respectively.

Note: You are not supposed to use the library's sort function for this problem.

Example:

Input: [2,0,2,1,1,0]

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

Follow up:

A rather straight forward solution is a two-pass algorithm using counting sort.

First, iterate the array counting number of 0's, 1's, and 2's, then overwrite array with total number of 0's, then 1's and followed by 2's.

Could you come up with a one-pass algorithm using only constant space?

10. Pascal's Triangle II

Given a non-negative index k where k ≤ 33, return the kth index row of the Pascal's triangle.

Note that the row index starts from 0.

In Pascal's triangle, each number is the sum of the two numbers directly above it.

Example:

Input: 3

Output: [1,3,3,1]

Follow up:

Could you optimize your algorithm to use only O(k) extra space?

11. Surrounded Regions

Given a 2D board containing 'X' and 'O' (the letter O), capture all regions surrounded by 'X'.

A region is captured by flipping all 'O's into 'X's in that surrounded region.

Example:

X X X X

X O O X

X X O X

X O X X

After running your function, the board should be:

X X X X

X X X X

X X X X

X O X X

Explanation:

Surrounded regions shouldn’t be on the border, which means that any 'O' on the border of the board are not flipped to 'X'. Any 'O' that is not on the border and it is not connected to an 'O' on the border will be flipped to 'X'. Two cells are connected if they are adjacent cells connected horizontally or vertically.

12. Single Number

Given a non-empty array of integers, every element appears twice except for one. Find that single one.

Note:

Your algorithm should have a linear runtime complexity. Could you implement it without using extra memory?

Example 1:

Input: [2,2,1]

Output: 1

Example 2:

Input: [4,1,2,1,2]

Output: 4