PROBLEMS OF THE DAY – 2

1.Kadane's Algorithm

Given an integer array arr[]. You need to find and return the maximum sum possible from all the subarrays.

Examples:

Input: arr[] = [1, 2, 3, -2, 5]

Output: 9

Explanation: Max subarray sum is 9 of elements (1, 2, 3, -2, 5).

Input: arr[] = [-1, -2, -3, -4]

Output: -1

Explanation: Max subarray sum is -1 of element (-1).

Expected Time Complexity: **O(n)**

Expected Auxiliary Space: **O(1)**

2.Array Leaders

Given an array arr of n positive integers, your task is to find all the leaders in the array. An element of the array is considered a leader if it is greater than all the elements on its right side or if it is equal to the maximum element on its right side. The rightmost element is always a leader.

Examples

Input: n = 6, arr[] = {16,17,4,3,5,2}

Output: 17 5 2

Explanation: Note that there is nothing greater on the right side of 17, 5 and, 2.

Input: n = 5, arr[] = {10,4,2,4,1}

Output: 10 4 4 1

Explanation: Note that both of the 4s are in output, as to be a leader an equal element is also allowed on the right. side

Input: n = 4, arr[] = {5, 10, 20, 40}

Output: 40

Explanation: When an array is sorted in increasing order, only the rightmost element is leader.

Expected Time Complexity: **O(n)**

Expected Auxiliary Space: **O(n)**

3.Minimize the sum of product

You are given two arrays arr1 and arr2. The task is to find the minimum value of arr1[0] * arr2[0] + arr1[1] * arr2[1] + ... + arr1[N-1] * arr2[N-1], where the shuffling of elements of arrays arr1 and arr2 is allowed.

Examples:

Input: arr1 = [3, 1, 1] , arr2 = [6, 5, 4]

Output: 23

Explanation: 1*6+1*5+3*4 = 6+5+12 = 23 is the minimum sum.

Input: arr1 = [6, 1, 9, 5, 4] , arr2 = [3, 4, 8, 2, 4]

Output: 80

Explanation: 2*9+3*6+4*5+4*4+8*1 = 18+18+20+16+8 = 80 is the minimum sum.

Expected Time Complexity: **O(nlog(n))**

Expected Auxiliary Space: **O(1)**

4.The Celebrity Problem

A celebrity is a person who is known to all but does not know anyone at a party. A party is being organized by some people. A square matrix mat is used to represent people at the party such that if an element of row i and column j is set to 1 it means ith person knows jth person. You need to return the index of the celebrity in the party, if the celebrity does not exist, return -1.

Note: Follow 0-based indexing.

Examples:

Input: mat[][] = [[0 1 0],

[0 0 0],

[0 1 0]]

Output: 1

Explanation: 0th and 2nd person both know 1. Therefore, 1 is the celebrity.

Input: mat[][] = [[0 1],

[1 0]]

Output: -1

Explanation: The two people at the party both know each other. None of them is a celebrity.

Expected Time Complexity: **O(n2)**

Expected Auxiliary Space: **O(1)**

5.Validate an IP Address

You are given a string str in the form of an IPv4 Address. Your task is to validate an IPv4 Address, if it is valid return true otherwise return false.

IPv4 addresses are canonically represented in dot-decimal notation, which consists of four decimal numbers, each ranging from 0 to 255, separated by dots, e.g., 172.16.254.1

A valid IPv4 Address is of the form x1.x2.x3.x4 where 0 <= (x1, x2, x3, x4) <= 255. Thus, we can write the generalized form of an IPv4 address as (0-255).(0-255).(0-255).(0-255)

Note: Here we are considering numbers only from 0 to 255 and any additional leading zeroes will be considered invalid.

Examples :

Input: str = 222.111.111.111

Output: true

Explanation: Here, the IPv4 address is as per the criteria mentioned and also all four decimal numbers lies in the mentioned range.

Input: str = 5555..555

Output: false

Explanation: 5555..555 is not a valid. IPv4 address, as the middle two portions are missing.

Expected Time Complexity: **O(n)**

Expected Auxiliary Space: **O(1)**