**Easy-Level Questions**

1. Write a function to check the grade of a student based on the score:

* 90-100: A
* 80-89: B
* 70-79: C
* 60-69: D
* Below 60: F

2. Write a function to determine whether a given number is positive, negative, or zero.

3. Write a function that takes three sides of a triangle and checks whether the triangle is equilateral, isosceles, or scalene.

4. Write a function to check whether a given character is a vowel or consonant.

5. Write a function that checks if a person is eligible to vote. The person is eligible if they are 18 years old or older.

6. Write a function that checks if a username and password match predefined values. If the username is "admin" and the password is "1234", print "Login successful"; otherwise, print "Login failed."

7. Write a function that simulates a traffic light system. The function should take the current light color (red, yellow, green) as input and print the corresponding action:

* "red" → "Stop"
* "yellow" → "Slow down"
* "green" → "Go"

8. Find the Average of an Array. **Example: Input:** arr=[1,2,3,4,5]; **Output:** 3

9. Sort an Array in Ascending Order **Example**: Input: nums = [4,2,8,5,1]; Output: nums = [1,2,4,5,8].

10. Given an array of integers, count how many numbers are even and how many are odd.

### **Example:**

* **Input:** [1, 2, 3, 4, 5]
* **Output:** Even: 2, Odd: 3

11. Remove duplicate elements from the array arr = [1, 2, 2, 3, 4, 4, 5] and print the updated array.

12. Add the number 6 to the end of the array arr = [1, 2, 3, 4, 5] and print the updated array. **Output:**[1,2,3,4,5,6]

13. Check if the array arr = [1, 2, 3, 4, 5] contains the number 3 and print true or false.

14. Add Element to the Beginning of an Array **Example**: Input: nums = [1, 2, 3, 4]; Output: nums = [0,1,2,3,4].

15. Remove the Last element Input: nums = [1, 2, 3, 4,5]; Output: nums = [1,2,3,4].

16. Check if all the elements in arr = [3, 5, 9, 1, 7] are positive numbers, and print true or false.

17. Count how many positive and negative numbers are in arr = [1, -2, 3, -4, 5, -6] and print the result.

18. Print all elements that are at even indexes in the array arr = [10, 20, 30, 40, 50]. **Output**:[10,30,50]

19. Check if the array arr = [1, 2, 3, 4, 5] is sorted in ascending order, and print true or false.

20. Find and print the difference between the maximum and minimum elements in arr = [80, 30, 70, 50, 20].

21. Write a program to convert a given string to uppercase.**Example**: Input: "hello", Output: "HELLO".

22. Write a program to find the length of a given string.**Example:Input:**inputString = "Hello, World!"**; Output:**13;

23. Write a program to concatenate two given strings. **Example**: Input: ("hello", " world"), Output: "hello world".

24. Write a program to remove whitespace from both ends of a string. **Example**: Input: " hello ", Output: "hello".

25. Write a program to split a string into an array of words. **Example: Input:** inputString ="Hello world, welcome to JavaScript!";**Output:**'Hello', 'world', 'welcome', 'to', 'JavaScript'

26. Write a program to check if a string ends with a specific character.**Example**: Input: ("codinggita", "a"), Output: true.

27. Write a program to extract the file extension from a given filename.**Example**: Input: "document.pdf", Output: "pdf".

28. Write a function that takes two numbers and prints the largest one.**Example:Input:**number1 = 10;, Number2= 20; **Output:**20;

29.Write a program to find all pairs in an array whose sum is equal to a given number.

**Example 1: Input:** nums = [2,7,11,15], target = 9 , **Output:** [0,1].

30. Write a program to input an integer ***'n'*** and print the sum of all its even digits and the sum of all its odd digits separately. **Example : Input:** n = 132456, **Output:** 12, 9

**Explanation:**

**The sum of even digits =** 2 + 4 + 6 = 12

**The sum of odd digits =** 1 + 3 + 5 = 9

31. Write a program to repeat a string a specified number of times.**Example**: **Input:** ("hello", 3), **Output:** "hellohellohello".

32.Write a program that categorizes a person’s age group based on the given age:

* Less than 13: "Child"
* Between 13 and 19: "Teenager"
* Between 20 and 59: "Adult"
* 60 and above: "Senior"

33. Write a program that takes a year as input and checks whether it is a century year (a year divisible by 100).

### **Explanation:**

* The function isCenturyYear takes a parameter year.
* It checks if the year is divisible by 100 using the modulus operator (%):
  + If year % 100 === 0, it prints that the year is a century year.
  + Otherwise, it prints that it is not a century year.

34. Access and print the first and last element of the array arr = [10, 20, 30, 40, 50]. **Output:**[10,50]

35. Print an inverted right-angled triangle pattern with n rows.

36. Print a pyramid pattern with n rows.

37. Given a sorted array and a target value, return the starting and ending position of that target in the array.**Example**:**Input:** [5, 7, 7, 8, 8, 10], **target=**8 ,**Output:** [3, 4]

38. Given a temperature in Celsius, convert it to Fahrenheit. **Example:Input:** 0 **Output:** 32.

39. Given a string, check if all brackets are closed properly. **Example:Input:** "{[()]}" **Output:** true

40. Given two numbers, generate an array containing all numbers between them (inclusive). **Example: Input:** 1,5 **Output:** [1, 2, 3, 4, 5]

41. Given a valid IP address, you are asked to return a defanged version of that IP address. A defanged IP address replaces every period "." with "[.]".

**Example1:Input:** address = "1.1.1.1" **Output:** "1[.]1[.]1[.]1"

**Example2:Input:** address = "255.100.50.0" **output:** "255[.]100[.]50[.]0"

42. Given two lists of events. Each event is represented by a start time and an end time. You need to determine if the two events conflict, which means if the events overlap in time.

**Input Format:**

* Each event is represented by a list [start, end], where start is the start time (inclusive) and end is the end time (exclusive).
* The events are represented as two arrays: event1 and event2.

#### **Output:**

* Return true if there is a conflict between the two events; otherwise, return false.

**Example 1:** Input: **event1 =** [1, 5], **event2 =** [5, 10] Output: false, **Exampe 2:** Input: **event1 =** [1, 5], **event2 =** [2, 3] Output: true.

43. The "Max Consecutive Ones" problem is a common algorithmic challenge that involves finding the maximum number of consecutive 1s in a binary array.

### **Problem Statement** Given a binary array, find the maximum number of consecutive 1s in the array.

### **Example**

* **Input:** [1, 1, 0, 1, 1, 1]
* **Output:** 3 (the longest sequence of 1s is 111)

44. Given a string, return all possible substrings of that string. This includes all substrings of every length, from length 1 to the length of the string itself.

### **Example:**

* **Input:** "abc"
* **Output:** ["a", "ab", "abc", "b", "bc","c"]

45. Given a sentence, return the longest word in it.

* **Input:** "I love programming in JavaScript"
* **Output:** "programming"

46. Given a string, return the index of the first repeating character. If no character repeats, return -1.

* **Input:** "hello"
* **Output:** 2 (because 'l' repeats first)
* **Input:** "abcdef"
* **Output:** -1

47. Given an array of integers, find the first element that repeats. If no element repeats, return -1.

* **Input:** [10, 5, 3, 4, 3, 5, 6]
* **Output:** 5

48.Given a string, return a new string with all vowels removed.

* **Input:** "hello"
* **Output:** "hll"

49. Given an array and two indices, swap the elements at those indices.

* **Input:** arr = [1, 2, 3, 4], i = 1, j = 3
* **Output:** [1, 4, 3, 2]

50. Given a string and a character, count how many times the character appears in the string.

* **Input:** str = "hello world", char = "o"
* **Output:** 2

51. Given two arrays, one containing keys and the other containing values, create an object that combines them.

* **Input:**
  + keys = ['name', 'age', 'city']
  + values = ['Alice', 30, 'New York']

**Output:**{name: 'Alice', age: 30, city: 'New York'}

52.Given an array nums, the running sum of an array is defined as runningSum[i] = sum(nums[0]…nums[i]).

**Example:**

* **Input:** nums = [1, 2, 3, 4]
* **Output:** [1, 3, 6, 10]
  + **Explanation:**
    - runningSum[0] = 1
    - runningSum[1] = 1 + 2 = 3
    - runningSum[2] = 1 + 2 + 3 = 6
    - runningSum[3] = 1 + 2 + 3 + 4 =10

53.Given an integer columnNumber, return *its corresponding column title as it appears in an Excel sheet*.

**For Example:**

A -> 1

B -> 2

C -> 3

...

Z -> 26

AA -> 27

AB -> 28…

**Example 1: Input:** n=28; O**utput**: "AB"

**Example 2: Input:**n=701; **Output:**"ZY"

54. An ugly number is a positive integer whose prime factors only include 2, 3, and 5. Given an integer n, write a program to determine if n is an ugly number.

**Example:**

* **Input**: n = 6
  + **Output**: true
* **Input**: n = 8
  + **Output**: true
* **Input**: n = 14
  + **Output**: false
* **Input**: n = 1
  + **Output**: true

55.You are given an integer n. Your task is to write a program that determines whether n is a power of three. If n is a power of three, return true; otherwise, return false.**A number is a power of three if:**n=3kn = 3^kn=3k

where k is a non-negative integer.

### **Example:**

* **Input**: n = 27
  + **Output**: true (since 33=273^3 = 2733=27)
* **Input**: n = 0
  + **Output**: false (since no power of 3 can be 0)

56. The **"Roman to Integer"** problem requires converting a string representing a Roman numeral into its equivalent integer value. Here’s a structured approach to solve it.

### **Problem Summary:**

* **Input**: A string s representing a Roman numeral.
* **Output**: The integer value of the Roman numeral.

### **Roman Numerals:**

The Roman numeral system uses the following characters:

* I = 1
* V = 5
* X = 10
* L = 50
* C = 100
* D = 500
* M = 1000

### **Rules:**

1. If a smaller numeral appears before a larger numeral, it should be subtracted (e.g., IV = 4, IX = 9).
2. Otherwise, the values should be added (e.g., VI = 6, XIII = 13).

57.You are given an integer array score of size n representing the scores of players. You need to return a string array answer of size n where:

* answer[i] is "Gold Medal" if the score of the i-th player is the highest.
* answer[i] is "Silver Medal" if the score of the i-th player is the second highest.
* answer[i] is "Bronze Medal" if the score of the i-th player is the third highest.
* Otherwise, answer[i] is the rank of the player (1-indexed).

**Example : Input:** score = [5,4,3,2,1]; **Output:** ["Gold Medal","Silver Medal","Bronze Medal","4","5"]

58. Given an integer n, return *true if it is a power of four. Otherwise, return false*.An integer n is a power of four, if there exists an integer x such that n == 4x.

**Example 1: Input:** n = 16, **Output:** true**; Example 2: Input:** n = 5, **Output:** false

59.Write a program that takes two numbers and an operator (+, -, \*, /) as input and performs the corresponding arithmetic operation using a switch statement.

#### **Example:**

* **Input**:
  + Number 1: 5
  + Number 2: 3
  + Operator: +
* **Output**: Result = 8

60.Write a program that takes an integer (1-7) as input and prints the corresponding day of the week (1 for Sunday, 2 for Monday, ..., 7 for Saturday) using a switch statement.

#### **Example:**

* **Input**: 3
* **Output**: Tuesday

61. Write a program that checks whether a given number is even or odd using a switch statement. Implement it as a menu-driven program where the user can choose the option.

#### **Example:**

* **Input**:
  + Option: 1 (Check even/odd)
  + Number: 6
* **Output**: 6 is even

62. Write a menu-driven program that allows the user to choose an operation (1 for square, 2 for cube, 3 for square root) on a given number using a switch statement.

#### **Example:**

* **Input**:
  + Option: 2 (cube)
  + Number: 3
* **Output**: Cube of 3 is 27

63.Write a program to check whether a given character is a vowel or a consonant using a switch statement.

#### **Example:**

* **Input**: a
* **Output**: a is a vowel

64.Write a recursive function to calculate the sum of the first n natural numbers. The sum of the first n numbers is given by:sum(n)=n+sum(n−1)

#### **Example:**

* **Input**: n = 5
* **Output**: 15  
  Explanation: 1+2+3+4+5=15

65.Write a recursive function to print numbers from 1 to n.

#### **Example:**

* **Input**: n = 5
* **Output**: 1 2 3 4 5

66.Write a recursive function to find the GCD of two numbers using the Euclidean algorithm.

**Example:Input**: Two integers a and b.

**Output**: The GCD of a and b.

67.Write a program to find the maximum element in a 2D array**.Example:int arr[ROWS][COLS]** = { {12, 45, 67, 23},{34, 78, 56, 90}, {11, 43, 29, 65} };**Output:**90;

68.Write a program to find the sum of all the elements in a 2D array. **Example:int arr[3][3] =** { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} }; **Output:**45

69.Write a program to print the elements on the main diagonal of a square matrix. The main diagonal consists of elements that have the same row and column index.

**Example: int arr[3][3] =** {1, 2, 3}, {4, 5, 6}, {7, 8, 9}; **Output:1**,5,9

70.Write a program to find the sum of each row in a 2D array and print it. **Example:int arr[3][3] =** { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} }; **Output:** Sum of row 1: 6 Sum of row 2: 15 Sum of row 3: 24

**Moderate-Level Questions**

1. Write a function that takes a digit (0-9) as input and returns the corresponding word. For example, input 1 should return "one".

2. Write a function that takes an hour (0-23) and prints an appropriate greeting based on the time:

* 5:00-11:59 → "Good morning"
* 12:00-17:59 → "Good afternoon"
* 18:00-21:59 → "Good evening"
* 22:00-4:59 → "Good night"

3. Write a simple calculator function that takes two numbers and an operator (+, -, \*, /) as input, then returns the result of the operation.

4. Write a function that simulates a simple login system. The user has 3 attempts to input the correct password. After 3 failed attempts, the function should print "Account locked."

5. Write a function that takes three numbers as input and returns the second largest number.**Input**:[1,5,10]; **Output:**15.

6. Write a program that prints numbers from 1 to 100. But for multiples of 3, print "Fizz" instead of the number, and for multiples of 5, print "Buzz". For numbers that are multiples of both 3 and 5, print "FizzBuzz".

7. Rotate the array arr = [1, 2, 3, 4, 5] to the left by one position and print the updated array **Output:** [2, 3, 4, 5, 1].

8. Given an array arr = [1, 2, 3, 4, 5, 6, 7, 8, 9] and a target sum sum = 10, find all pairs of numbers that add up to the sum.

9. Rotate the array arr = [1, 2, 3, 4, 5] by k = 2 positions to the right .**Output:** [4, 5, 1, 2, 3]

10. Merge two sorted arrays arr1 = [1, 3, 5] and arr2 = [2, 4, 6] into one sorted array and print the result.

11. Given an array arr = [1, -2, 3, -4, 5, -6], rearrange it so that positive and negative numbers alternate. **Example 1: Input:** arr =[1,2,3,-1,-3,-5]; **Output**:false: **Example 2: Input:** arr = [1, -2, 3, -4, 5, -6]; **Output:** false

### **Explanation:**

1. **Counting**: The loop iterates through each number in the array, counting how many are positive and how many are negative.
2. **Condition Check**: The Math.abs(positives - negatives) <= 1 checks if the counts of positives and negatives allow for a valid alternating arrangement.
3. **Return Result**: The function returns true if the arrangement is possible and false otherwise.

12. Write a program to find the maximum element in an array. **Example**: Input: [1, 3, 5, 2, 4], Output: 5.

13. Write a program to count the number of vowels in a string.**Example**: Input: "hello", Output: 2.

14. Find and print the index of the number 4 in the array arr = [1, 2, 3, 4, 5].**Output:**3

15. [4Sum](https://leetcode.com/problems/4sum/)

Given an array nums of n integers, return *an array of all the* ***unique*** *quadruplets* [nums[a], nums[b], nums[c], nums[d]] such that:

* 0 <= a, b, c, d < n
* a, b, c, and d are **distinct**.
* nums[a] + nums[b] + nums[c] + nums[d] == target

You may return the answer in **any order**.

**Example 1: Input:** nums = [1,0,-1,0,-2,2], **target** = 0; **Output:** [[-2,-1,1,2],[-2,0,0,2],[-1,0,0,1]]

16. Find and print the second largest element in the array arr = [10, 20, 5, 30, 15]. **Output:**20

### **Explanation:**

1. **Initialization**:
   * first and second are initialized to -Infinity to ensure they can be updated with the values from the array.
2. **Iteration**:
   * The loop iterates through each element of the array.
   * If the current element is greater than first, it updates second to the value of first, and then updates first to the current element.
   * If the current element is greater than second but not equal to first, it updates second to the current element.
3. **Edge Case Handling**:
   * After iterating, if second is still -Infinity, it indicates that there is no valid second largest element in the array.
4. **Output**:
   * The function prints the second largest element if it exists.

17. Rotate the array arr = [1, 2, 3, 4, 5] to the right by one position and print the updated array **Output:** [5, 1, 2, 3, 4].

18. Move all the zeroes in the array arr = [1, 0, 2, 0, 3, 0, 4] to the end. **Output:**[1,2,3,4,0,0,0]

19. Check if two strings are anagrams of each other. **Example**: Input:let str1 = "listen"; let str2 = "silent"; output:true.

20. You are given a non-negative integer n. Your task is to calculate the difference between the product of its digits and the sum of its digits.

Specifically, you need to:

* Find the product of the digits of n.
* Find the sum of the digits of n.
* Return the difference: **(Product of digits) - (Sum of digits)**.

21. Write a program to create a new array where each element is the square of the corresponding element in the original array **Example**: Input: nums = [1, 2, 3, 4]; Output: nums = [1,4,9,16].

23.You are given two strings, word1 and word2. Merge the strings by adding letters in alternating order, starting with word1. If one string is longer than the other, append the remaining letters from the longer string to the end of the merged string. Return the merged string.

.**Example**:Input:**word1=**"abc",**word2=**"pqr", Output:"apbqcr".

24.Given two strings s and t, return true *if* s *is a* ***subsequence*** *of* t*, or* false *otherwise*. **Example 1:Input: s=**"abc", **t=**"ahbgdc" **output:**true, **Example 2:** **input:** s="axc", **t=**"ahbgdc" **Output:** false.

25. Replace all negative numbers in arr = [-1, 2, -3, 4, -5] with zero and print the updated array. **Output:** [0, 2, 0, 4, 0].

26. Given an array where each element represents the stock price on a given day, find the maximum profit that can be made by buying and then selling the stock. **Example**: arr = [7, 1, 5, 3, 6, 4], output should be 5 (buy on day 2 and sell on day 5).

27. Write a program that takes three numbers as input and prints the largest of the three using if-else statements.

28. Write a program to calculate the electricity bill based on the following rates:

* For the first 100 units: $1.5 per unit
* For the next 100 units (101-200): $2.5 per unit
* For units above 200: $3.5 per unit

29. You are given two string arrays word1 and word2. A string array is considered **equivalent** if the strings in the array concatenated form the same string. Return true if word1 and word2 are equivalent, otherwise return false. **Example 1:** **Input:** word1 = ["ab", "c"], word2 = ["a", "bc"] **Output:** true. **Example 2 :Input:** word1 = ["a", "cb"], **word2 =** ["ab", "c"] **Output:** false.

30. Given an integer array nums, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.**Example1. Input**:nums = [-2, 1, -3, 4, -1, 2, 1, -5, 4], **Output:** 6 //The subarray [4, -1, 2, 1] has the largest sum = 6.

31. Given an array of characters, compress it in-place. The length after compression must be the same or smaller than the original array. Compression should be done using the following rules:

* Count consecutive repeating characters and store the character followed by the count.**Example**: **Input: ["a","a","b","b","c","c","c"],Output:["a","2","b","2","c","3"].**

32. Given an array nums of n integers where n > 1, return an array output such that output[i] is equal to the product of all the elements of nums except nums[i]**.Example:Input:** [1, 2, 3, 4] **Output:** [24, 12, 8, 6].

33.Sum of Square Numbers:

**Problem Statement:** Given a non-negative integer c, determine whether there are two integers a and b such that:a2+b2 =c

**Example 1:Input:** c = 5; **Output:** true; Explanation: 1 \* 1 + 2 \* 2 = 5.

34. Given an array containing n distinct numbers taken from 0 to n, find the missing number. **Example: Input:** [3, 0, 1], **Output:** 2.

35. Given a string word and a character ch, reverse the segment of word that starts at the beginning and ends at the first occurrence of ch (inclusive). If ch does not exist in word, return word unchanged. **Example: Input:** word = "abcdefd", ch = "d", **Output:** "dcbaef"

36. Given a string s, reverse the order of characters in each word within a sentence while still preserving whitespace and initial word order. **Example: Input:** s = "Let's take LeetCode contest" **Output:** "s'teL ekat edoCteeL tsetnoc".

37. **Check If Array is Monotonic**

**Description**: An array is considered monotonic if it is either entirely non-increasing or entirely non-decreasing. Given an array, return true if the array is monotonic, otherwise return false. **Example1: Input:** nums = [1, 2, 2, 3] **Output:** true, **example2: Input:** nums = [1, 3, 2] **Output:** false

38. **Plus One**

**Description:** You are given a large integer represented as an array of digits where each digit is in the range [0, 9]. The most significant digit is at the start of the array. Increment the large integer by one and return the resulting array of digits. **Example: Input:** digits = [1, 2, 3] **Output:** [1, 2, 4]

39. Number of Students Doing Homework at a Given Time.

**Description:** You are given two integer arrays startTime and endTime, and an integer queryTime. The i-th student started their homework at the time startTime[i] and finished it at the time endTime[i].

Return the number of students doing their homework at queryTime. More formally, return the number of students where queryTime lies in the interval [startTime[i], endTime[i]] inclusive.

**Example 1: Input:** startTime = [1, 2, 3], endTime = [3, 2, 7], queryTime = 4 **Output:** 1 **Explanation:** Only the third student was doing homework at time 4.

40. You are given a list of strings sentences, where each sentence is a string containing words separated by spaces. Your task is to return the maximum number of words found in any single sentence.

**Example 1: Input:** sentences = ["alice and bob love leetcode", "i think so too", "this is great thanks very much"] **Output:** 6

Explanation: The first sentence has 5 words.

- The second sentence has 4 words.

- The third sentence has 6 words.

Thus, the maximum number of words is 6.

41.You are given an n x n 2D matrix representing an image, rotate the image by 90 degrees (clockwise). You must rotate the matrix **in-place**, which means you cannot use another 2D matrix to accomplish the rotation.

### **Example:**

**Input:** matrix = [[1,2,3],

[4,5,6],

[7,8,9]]

**Output:** [[7,4,1],

[8,5,2],

[9,6,3]]

42. Given an integer num, repeatedly add all its digits until the result has only one digit, and return it.**Example:** Input **:num = 38,** Output: **2.**

**Explanation:**

* **The process is like:**
  + **38 → 3 + 8 = 11**
  + **11 → 1 + 1 = 2**
  + **Since 2 has only one digit, return 2.**

43. To count the number of pairs in an array where the two elements are equal and their indices are divisible, we can follow this approach:

### Problem Breakdown:

* You have an array of integers, and you need to find how many pairs (i, j) satisfy:
  1. arr[i] == arr[j]
  2. i < j
  3. i % j == 0 (index i is divisible by index j)

**Example: Input:** nums = [3,1,2,2,2,1,3], k = 2, **Output:** 4

44. To solve the problem of counting the **Number of Employees Who Met the Target**, where you are given an array of employee performances (as integers) and a target, the goal is to count how many employees have performance equal to or greater than the target.

**Example:Input:**hourse=[0,1,2,3,4],target=2,**Output:**3

45. Given a string s, the task is to check whether the string can be constructed by taking a substring of it and appending multiple copies of the substring together. **Example:**

* **Input:** s = "abab"
* **Output:** true (The string is made by repeating the substring "ab" twice)
* **Input:** s = "aba"
* **Output:** false (The string cannot be constructed from a repeated substring)

46. You are given a list of words, and you need to return the words that can be typed using letters from only one row of a **QWERTY** keyboard.

### **QWERTY Keyboard Layout:**

* **Row 1**: QWERTYUIOP
* **Row 2**: ASDFGHJKL
* **Row 3**: ZXCVBNM

### **Example:Input:** words = ["Hello","Alaska","Dad","Peace"], **Output:** ["Alaska","Dad"]

47. Given an integer numRows, return the first numRows of **Pascal's triangle**.

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

### **Example:**

* **Input**: numRows = 5
* **Output**

[

[1],

[1,1],

[1,2,1],

[1,3,3,1],

[1,4,6,4,1]]

### **Explanation:**

* The first row is [1].
* The second row is formed by taking the previous row, starting and ending with 1, and the middle value is formed by summing up 1 + 1 to get [1, 1].
* Similarly, each row is formed by summing up the two numbers directly above.

48.You are given two **axis-aligned** rectangles. The first rectangle is defined by its bottom-left corner (rec1[0], rec1[1]) and top-right corner (rec1[2], rec1[3]). The second rectangle is defined in the same way.

Two rectangles overlap if the area of their intersection is **positive**. To be clear, two rectangles that only touch at the corner or edges do not overlap.

Return true if the two rectangles overlap, otherwise return false.

### **Example 1:**

* **Input**:rec1 = [0, 0, 2, 2]; rec2 = [1, 1, 3, 3], **Output:** true;

### **Example:**

* **Input:** rec1 = [0,0,1,1];rec2 =[1, 0, 2,1]; **Othuput:** false;

49. You are given an m x n integer grid accounts where accounts[i][j] is the amount of money the i-th customer has in the j-th bank account. Return the **wealth** that the richest customer has.

A customer's **wealth** is the sum of money they have in all their bank accounts. The richest customer is the customer that has the maximum wealth.

### **Example: Input:** accounts = [[1,5], [7,3], [3,5]]**; Output =**10**.**

**Explanation**:

* The first customer has a wealth of 1 + 5 = 6.
* The second customer has a wealth of 7 + 3 = 10.
* The third customer has a wealth of 3 + 5 = 8.
* The richest customer has a wealth of 10.

50. A **lucky number** is defined as an element of the matrix that is the **minimum** element in its row and the **maximum** in its column.

You are given an m x n matrix of distinct numbers. Return all lucky numbers in the matrix in **any order**

### **Example: Input:** matrix = [[3,7,8], [9,11,13], [15,16,17]]; **Output:**15

### **Explanation:**

### In the first row, the minimum is 3.

### In the second row, the minimum is 9.

### In the third row, the minimum is 15.

### For the numbers 3, 9, and 15, the maximum in their columns are:

### For 3: maximum in the first column is 15.

### For 9: maximum in the first column is 15.

### For 15: maximum in the first column is 15.

### Hence, 15 is the only lucky number.

### 51. Given an integer n, break it into the sum of k positive integers, where k >= 2, and maximize the product of those integers. Return the maximum product you can get.

### **Example:**

### **Input:** n =10

### **Output**: 36

### **Explanation:** The best way to split 10 is 3 + 3 + 4, and the product of 3 \* 3 \* 4 = 36.

### 52.The " 3Sum" problem is a classic algorithmic problem where the goal is to find all unique triplets in an array that sum up to zero. Here’s a step-by-step explanation of how to solve it efficiently using a two-pointer approach, along with the code.

### **Problem:**

### Given an integer array nums, return all the triplets [nums[i], nums[j], nums[k]] such that:

### i != j != k

### nums[i] + nums[j] + nums[k] == 0

### The solution set must not contain duplicate triplets.

### **Example:Input:** nums=[-1, 0, 1, 2, -1, -4]; **Output:**[-1, -1, 2], [-1, 0, 1]

53.The **"Integer to Roman"** problem requires converting an integer to its equivalent Roman numeral representation. Here’s a structured approach to solving this problem.

### **Problem Summary:**

* **Input**: An integer num ranging from 1 to 3999.
* **Output**: A string representing the Roman numeral corresponding to the integer.

### **Roman Numerals:**

The Roman numeral system includes the following characters and their values:

* I = 1
* V = 5
* X = 10
* L = 50
* C = 100
* D = 500
* M = 1000

### **Special Cases:**

In Roman numerals, certain numbers are represented by subtractive notation:

* 4 = IV (5 - 1)
* 9 = IX (10 - 1)
* 40 = XL (50 - 10)
* 90 = XC (100 - 10)
* 400 = CD (500 - 100)
* 900 = CM (1000 - 100)

**Example1: Input:** nums=9, **Output:** "IX", **Example2: Input:** nums=1994, **Output:** "MCMXCIV"

54. Given a string s, return *the number of* ***homogenous*** *substrings of* s*.* Since the answer may be too large, return it **modulo** 109 + 7.

A string is **homogenous** if all the characters of the string are the same.A **substring** is a contiguous sequence of characters within a string.

**Example 1: Input:** s = "abbcccaa" **Output:** 13

**Explanation:** The homogenous substrings are: "a", "b", "b", "c", "c", "c", "a", "aa", "bb", "cc", "ccc", "a", "aa" (13 in total).

**Example 1: Input**: s ="xy" **Output**:3

**Explanation**: The homogenous substrings are: "x", "y", "xy" (3 in total).

55. Given an integer array nums of **unique** elements, return *all possible* *Subsets (the power set)*

The solution set **must not** contain duplicate subsets. Return the solution in **any order**.

**Example 1:Input:** nums = [1,2,3]; **Output:** [[],[1],[2],[1,2],[3],[1,3],[2,3],[1,2,3]]

56.Write a program to print the elements of a matrix in spiral order. **Example: int matrix[3][3] =** { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} }; **Output:1** 2 3 6 9 8 7 4 5

57.A saddle point in a matrix is an element that is the minimum in its row and the maximum in its column. Write a program to find the saddle point of a matrix. **Example:int matrix[3][3] =** { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} }; **Output:**7

58.Write a program to flatten a 3D array into a 1D array. **Example:int arr[2][2][3] =** { { {1, 2, 3}, {4, 5, 6} }, { {7, 8, 9}, {10, 11, 12} }; **Output:Flattened 1D array:** 1 2 3 4 5 6 7 8 9 10 11 12

59.Write a program to print the boundary elements of a matrix. Boundary elements are the elements located on the outermost rows and columns of the matrix. **Example: int matrix[4][4] =** { {1, 2, 3, 4}, {5, 6, 7, 8}, {9, 10, 11, 12}, {13, 14, 15, 16} }; **Output:** 1 2 3 4 8 12 16 15 14 13 9 5.

60. Write a program to count how many negative numbers are present in a 3D array. **Example: int arr[2][2][3] =** { { {-1, 2, 3}, {4, -5, 6} }, { {7, -8, 9}, {10, 11, -12} }; **Output:** -1, -5, -8, -12.