Capgemini Coding CheatSheet

1. **Problem Statement –**

Capgemini in its online written test have a coding question, wherein the students are given a string with multiple characters that are repeated consecutively. You're supposed to reduce the size of this string using mathematical logic given as in the example below :

Input :

aabbbbeeeeffggg

Output:

a2b4e4f2g3

2. **Problem Statement –**

Write the code to traverse a matrix in a spiral format.

Sample Input

Input

5 4

1 2 3 4

5 6 7 8

9 10 11 12

13 14 15 16

17 18 19 20

Output

1 2 3 4 8 12 16 20 19 18 17 13 9 5 6 7 11 15 12 14 10

3. **Problem Statement –**

You're given an array of integers, print the number of times each integer has occurred in the array.

Example

Input :

10

1 2 3 3 4 1 4 5 1 2

Output :

1 occurs 3 times

2 occurs 2 times

3 occurs 2 times

4 occurs 2 times

5 occurs 1 times

4. **Problem Statement –**

Write a function to solve the following equation a3 + a2b + 2a2b + 2ab2 + ab2 + b3.

Write a program to accept three values in order of a, b and c and get the result of the above equation.

5. **Problem Statement –**

A function is there which tells how many dealerships there are and the total number of cars in each dealership.

Your job is to calculate how many tyres would be there in each dealership.

Input

3

4 2

4 0

1 2

Output

20

16

8

There are total 3 dealerships

dealerships1 contains 4 cars and 2 bikes

dealerships2 contains 4 cars and 0 bikes

dealerships3 contains 1 cars and 2 bikes

Total number of tyres in dealerships1 is (4 × 4) + (2 × 2) = 20

Total number of tyres in dealerships2 is (4 × 4) + (0 x 2) = 16

Total number of tyres in dealerships3 is (1 × 4) + (2 × 2) = 8

6. **Problem Statement**

Bela teaches her daughter to find the factors of a given number. When she provides a number to her daughter, she should tell the factors of that number. Help her to do this, by writing a program. Write a class FindFactor.java and write the main method in it.

Note :

- If the input provided is negative, ignore the sign and provide the output. If the input is zero
- If the input is zero the output should be “No Factors”.

Sample Input 1:

54

Sample Output 1:

1, 2, 3, 6, 9, 18, 27, 54

7. **Problem Statement**

Raj wants to know the maximum marks scored by him in each semester. The mark should be between 0 to 100 ,if it goes beyond the range display “You

have entered invalid mark."

Sample Input 1:

- Enter no of semester:3
- Enter no of subjects in 1 semester:3
- Enter no of subjects in 2 semester:4
- Enter no of subjects in 3 semester:2
- Marks obtained in semester 1:506070
- Marks obtained in semester 2:90987667
- Marks obtained in semester 3:8976

Sample Output 1:

- Maximum mark in 1 semester:70
- Maximum mark in 2 semester:98
- Maximum mark in 3 semester:89

8. **Problem Statement**

Mayuri buys "N" no of products from a shop. The shop offers a different percentage of discount on each item. She wants to know the item that has the minimum discount offer, so that she can avoid buying that and save money.[Input Format: The first input refers to the no of items; the second input is the item name, price and discount percentage separated by comma(,)]Assume the minimum discount offer is in the form of Integer. Note: There can be more than one product with a minimum discount.

Sample Input 1:

4

mobile,10000,20

shoe,5000,10

watch,6000,15

laptop,35000,5

Sample Output 1:

shoe

Explanation: The discount on the mobile is 2000, the discount on the shoe is 500, the discount on the watch is 900 and the discount on the laptop is 1750. So the discount on the shoe is the minimum.

9. **Problem Statement**

You have write a function that accepts, a string which length is "len", the string has some "#", in it you have to move all the hashes to the front of the string and return the whole string back and print it.

char* moveHash(char str[],int n);

example :-

Sample Test Case

Input:

Move#Hash#to#Front

Output:

MoveHashtoFront

10. **Shraddha Kapoor's professor suggested that she study hard and prepare well for the lesson on seasons. If her professor says month then, she has to tell the name of the season corresponding to that month. So write the program to get the solution to the above task?**

- March to May – Spring Season
- June to August – Summer Season
- September to November – Autumn Season
- December to February – Winter Season

Note: The entered month should be in the range of 1 to 12. If the user enters a month less than 1 or greater than 12 then the message "Invalid Month Entered" should get displayed.

Sample Input 1:

Enter month: 6

Sample Output 1:

Season: Summer

11. **Counting Valleys**:

- **Problem**: Given a sequence of up and down steps during a hike, determine the number of valleys traversed.
- **Input**:
  - `8`
  - `UDDDUDUU`
- **Output**: `1`
- **Explanation**: A valley is a sequence of consecutive steps below sea level. The example describes a single valley.

12. **Matrix Identity Check**:

- **Problem**: Write a program to check if two given matrices are identical.
- **Input**:
  - `Matrix A: [[1,1,1,1], [2,2,2,2], [3,3,3,3], [4,4,4,4]]`
  - `Matrix B: [[1,1,1,1], [2,2,2,2], [3,3,3,3], [4,4,4,4]]`
- **Output**: `Matrices are identical`
- **Explanation**: The program checks each corresponding element in both matrices for equality.

13. **Pythagorean Triplets**:

- **Problem**: Generate all Pythagorean triplets with values smaller than a given limit.
- **Input**: `limit = 20`

- **Output**:
  - `3 4 5`
  - `8 6 10`
  - `5 12 13`
  - `15 8 17`
  - `12 16 20`
- **Explanation**: The triplets satisfy the condition `a² + b² = c²`, where `a`, `b`, and `c` are integers.

14. **Binary Search**:
    - **Problem**: Implement a binary search algorithm to find a target value in a sorted array.
    - **Input**:
      - `Array: [1, 2, 3, 4, 5, 6, 7, 8, 9]`
      - `Target: 4`
    - **Output**: `3`
    - **Explanation**: The function returns the index of the target value in the array.

15. **String Rotation**:
    - **Problem**: Determine if one string is a rotation of another.
    - **Input**:
      - `String A: "ABCD"`
      - `String B: "CDAB"`
    - **Output**: `True`
    - **Explanation**: `B` is a rotation of `A`.

16. **Find the Missing Number in an Array**:
    - **Problem**: Given an array containing `n-1` integers in the range from `1 to n`, find the missing number.
    - **Input**:
        - `Array: [1, 2, 4, 5, 6]`
    - **Output**: `3`
    - **Explanation**: The missing number is `3`.
17. **Reverse a Linked List**:
    - **Problem**: Write a function to reverse a singly linked list.
    - **Input**:
        - `1 -> 2 -> 3 -> 4 -> 5`
    - **Output**:
        - `5 -> 4 -> 3 -> 2 -> 1`
    - **Explanation**: The list is reversed.
18. **Longest Substring Without Repeating Characters**:
    - **Problem**: Given a string, find the length of the longest substring without repeating characters.
    - **Input**:
        - `String: "abcabcbb"`
    - **Output**: `3`
    - **Explanation**: The longest substring is `"abc"`, which has a length of 3.
19. **Find the Duplicates in an Array**:
    - **Problem**: Find duplicates in a given array of integers.
    - **Input**:
        - `Array: [4, 3, 2, 7, 8, 2, 3, 1]`
    - **Output**:
        - `Duplicates: 2, 3`

- **Explanation**: Numbers `2` and `3` are repeated.

20. **Check if a Number is Prime**:
    - **Problem**: Write a function to check if a given number is prime.
    - **Input**:
        - `Number: 29`
    - **Output**: `True`
    - **Explanation**: 29 is a prime number.
21. **Merge Two Sorted Arrays**:
    - **Problem**: Merge two sorted arrays into a single sorted array.
    - **Input**:
        - `Array 1: [1, 3, 5]`
        - `Array 2: [2, 4, 6]`
    - **Output**:
        - `[1, 2, 3, 4, 5, 6]`
22. **Rotate an Array**:
    - **Problem**: Rotate an array by `k` steps to the right.
    - **Input**:
        - `Array: [1, 2, 3, 4, 5]`
        - `k = 2`
    - **Output**:
        - `[4, 5, 1, 2, 3]`
    - **Explanation**: The array is rotated by 2 positions.
23. **Check for Balanced Parentheses**:
    - **Problem**: Given a string containing just the characters `(`, `)`, `{`, `}`, `[` and `]`, determine if the input string is valid.
    - **Input**:
        - `String: "{[()]}"`
    - **Output**:

    - `True`
- **Explanation**: The string has balanced parentheses.

24. **Largest Sum Contiguous Subarray (Kadane's Algorithm)**:
    - **Problem**: Find the maximum sum of a contiguous subarray.
    - **Input**:
        - `Array: [-2, 1, -3, 4, -1, 2, 1, -5, 4]`
    - **Output**:
        - `6`
    - **Explanation**: The subarray `[4, -1, 2, 1]` has the largest sum = 6.
25. **Find the Intersection of Two Arrays**:

Problem: Find the intersection of two unsorted arrays.

Input:

- `Array 1: [1, 2, 2, 1]`
- `Array 2: [2, 2]`

Output:

- `[2]`

Explanation: The common element between the arrays is `2`.

26. **Check for Palindrome**:

Problem: Given a string, check if it is a palindrome.

Input:

- `String: "racecar"`

Output: `True`

Explanation: The string reads the same backward as forward.

27. **Matrix Rotation by 90 Degrees**:

Problem: Rotate a 2D matrix by 90 degrees clockwise.

Input:

- `Matrix: [[1, 2, 3], [4, 5, 6], [7, 8, 9]]`

Output:

- `[[7, 4, 1], [8, 5, 2], [9, 6, 3]]`

Explanation: The matrix is rotated 90 degrees clockwise.

28. **Find the Majority Element**:

Problem: Given an array of size `n`, find the majority element (appears more than `n/2` times).

Input:

- `Array: [2, 2, 1, 1, 1, 2, 2]`

Output:

- `2`

Explanation: The number `2` appears more than `n/2` times.

29. **Find the First Non-Repeated Character in a String**:
    - **Problem**: Given a string, find the first character that does not repeat.
    - **Input**:
        - `String: "swiss"`
    - **Output**:
        - `w`
    - **Explanation**: 'w' is the first character that does not repeat in the string.
30. **Merge Intervals**:
    - **Problem**: Given a collection of intervals, merge all overlapping intervals.
    - **Input**:
        - `Intervals: [[1,3],[2,6],[8,10],[15,18]]`
    - **Output**:
        - `[[1,6],[8,10],[15,18]]`

- **Explanation**: Intervals [1,3] and [2,6] overlap, so they are merged into [1,6]. The others remain unchanged.