Sample Programming questions for reference

Consider writing C++ programs.

Write a C program to find and print all unique elements in an array. The program should first take the size of the array as input. Then, it should take array elements from the user. Finally, the program should display all the elements that appear only once in the array.

Test Case 1: **n = 6, [1, 2, 3, 2, 3, 4]** **Unique elements : 1 4**	**Test Case 2:** **n = 5, [5, 5, 5, 5, 5]** **No Unique Elements**	**Test Case 3:** **n = 4, [7, 8, 9, 10]** **Unique elements:7 8 9 10**

Taking input for array size & array elements 2 marks
Find and print all unique elements in an array 5 marks
Check all test cases 1 marks

The program takes the number of students as input. It stores marks in an array from user-input. It uses user-defined functions to:

- Input the marks in array
- Identify the second-highest mark.
- Allow the teacher to update a student's mark by entering the student index.
- Display Marks

Use Menu-Driven Programme.

Test Case 1: **Enter the number of students: 5** **Enter marks of 5 students: 45 78 90 78 65** **Second-highest mark: 78** **Enter student index to update (0 to 4): 2** **Enter new mark: 85** **Updated marks: 45 78 85 78 65**	**Test Case 2:** **Enter the number of students: 3** **Enter marks of 3 students: 60 70 80** **Enter student index to update (0 to 2): 2** **Enter new mark: 50** **Updated marks: 60 70 50** **Second-highest mark: 60**

Function to Input mark 2 marks
Function to find the Second highest mark 3 marks
Function to update mark 3 marks
Function to display mark 2 marks
Implement Switch-case 2 marks

A music player app stores song IDs in an array. A user requests the following feature. (Input / Sort / reverse / display) Use Menu-Driven Programme.
Requirements:

A. The program should take the number of songs as user input.
B. The program should have a function to take input from the user and store song IDs in an array.
C. Sort the playlist in ascending order.
D. The program should have a function to reverse the playlist.
E. The program should display the playlist.
F. All functions should be implemented using Pointer.

Test Case 1: **Enter the number of songs: 4** **Enter 4 song IDs: 88 66 99 77** **Original Playlist: 88 66 99 77** **Sorted Playlist: 66 77 88 99** **Reversed Playlist: 99 88 77 66**	**Test Case 2:** **Enter the number of songs: 5** **Enter 5 song IDs: 505 101 404 202 303** **Original Playlist: 505 101 404 202 303** **Reversed Playlist: 303 202 404 101 505** **Sorted Playlist: 101 202 303 404 505**

Function to inputPlaylist using pointers 2 marks
Function to Sort the list using pointers 3 marks
Function to reverse the playlist using pointers 3 marks
Function to display the playlist using pointer 2 marks
Implement Switch-case 2 marks

Write a C program that simulates a traffic light system using a switch-case structure. The program should: Allow the user to input a traffic light color: "Green", "Red", or "Yellow" (case-sensitive). Display appropriate messages based on the input. Track the number of times each color has been entered. Exit when the user enters "Exit", displaying a summary of how many times each color was entered. Reject invalid inputs and prompt the user again.

Test Case:

Input	Output
Green	Go ahead!
Red	Stop!
Yellow	Slow down!
blue	Invalid input! Try again.
GrEeN	Invalid input! Try again.
yellow	Invalid input! Try again.
Exit	(Displays summary & exits)

Traffic Light Summary:
Green entered: 1 times
Red entered: 1 time
Yellow entered: 1 times

Input from user 1 marks
Implementation of switch-case loop 3 marks
Implementation of while loop 2 marks
Display summary 2 marks

Write a C program that takes a string and two integers (n1, n2). Now reverse the sequence of characters in the string between n1 and n2. (Note: First character indices start from 1]

Test Case 1:	**Test Case 2:**	**Test Case 3:**
Enter a string: "abcdxyabcd" Enter two indices (n1 and n2): 5 6 Modified string: "abcdyxabcd"	Enter a string: "programme" Enter two indices (n1 and n2): 4 7 Modified string: "promargme"	Enter a string: "Exercises" Enter two indices (n1 and n2): 1 3 Modified string: "exErcises"

Input string and range 2 marks
reverse a portion of the string 4 marks
Print modified string for all test case 2 marks

Write a program to generate a diamond pattern based on user input n ($1 \leq n \leq 50$).

The program should use a for loop to print the upper half and a while loop to print the lower half.
Add a goto statement to restart the pattern generation if the user provides an invalid input (e.g., $n < 1$ or $n > 50$).
The pattern should look like this for n = 5:

```
  *
 ***
*****
 ***
  *
```

Show the output for three different values of ***n***.
Input from user 1 marks
Upper half using for loop 3 marks
Lower half using while loops 3 marks
Check all test cases 1 marks

Write a program to input a sentence (character array) of at most 20 characters and perform the following: Replace every vowel in the sentence with the next vowel in cyclic order (e.g., 'a' → 'e', 'e' → 'i', ..., 'u' → 'a'). (Using Switch-case statements)

Test Case 1:	**Test Case 2:**	**Test Case 3:**
Enter a sentence : hello world Modified sentence after vowel replacement: hillu wurld	Enter a sentence : programming Modified sentence after vowel replacement: pregrommong	Enter a sentence : OpenAI Modified sentence after vowel replacement: UpinEO

Input from user 1 marks
Logic to replace vowels 5 marks
Output and check all test cases 2 marks

Write a C program that implements a **multi-factor authentication system** with the following security features:

1. The user must **enter a correct password** within **3 attempts**.
2. If the password is incorrect, allow the user to reattempt.
3. If the password is correct, the user must **answer a security question correctly** to gain access.
4. If all 3 attempts fail, print **"Too many failed attempts. Access Denied!"**
5. Use **#define** to set:
    - **Password**
    - **Security answer**
    - **Maximum allowed attempts**

Test Case 1: Secure Login System Enter password: ramsita Password Correct! Security Question: What is your favorite color? Answer: Blue Access Granted!	**Test Case 3:** Secure Login System Enter password: RAMSITA Incorrect password. Attempts left: 2 Enter password: RamSita Incorrect password. Attempts left: 1 Enter password: Ramsita Too many failed attempts. Access Denied!

Write a C program that generates a prime number pyramid based on user input. The user inputs the number of rows (R).

Test Case 1: Enter number of rows: 5 2 3 5 7 11 13 17 19 23 29 31 37 41 43 47	**Test Case 2:** Enter number of rows: 3 2 3 5 7 11 13

Input from user 1 marks
check if a number is prime 3 marks
generate the prime number pyramid 3 marks
Output and check all test cases 1 marks