

United International University

Department of Computer Science and Engineering

Final Examination Fall 2024

Course Code: **CSE 1112** Course Title: **Structured Programming Language Laboratory**

Date: Feb 11, 2025 (Tuesday) Time: 11:30 AM - 01:30 PM (1 hour) Full marks: 25

Name:

Student ID:

Write down C programs for the following problems in Code Blocks (or any C compiler you prefer), and present the code to your instructor after the time is up. You can make rough calculations in this paper. **Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.**

Problem 1 (Marks: 13)

Write a C program that takes **an array as input** from the user. Then using the following functions determines whether **all the array elements are prime numbers or not**. Moreover, the program must also determine whether **the sum of all the elements of the array is a prime number or not**.

1. **int is_prime(int n):** This function should take an integer n as input and return 1 if n is a prime number, otherwise return 0.
2. **int all_primes(int arr[], int size):** This function should take an array arr and its size as input and return 1 if all the numbers in the array are prime, otherwise return 0. Note that this function must use the is_prime function described above.
3. **int sum_is_prime(int *arr, int size):** This function should take an array arr and its size as input and return 1 if the sum of all the numbers in the array is a prime number, otherwise return 0. Note that this function must use the is_prime function described above.

Sample Input	Sample Output
Enter the size of the array 4 Enter the array elements 2 3 5 7	All the elements of the given array are prime. The sum of the array elements is a prime number

Enter the size of the array 4 Enter the array elements 4 6 8 10	All the elements of the given array are not prime. The sum of the array elements is not a prime number
Enter the size of the array 4 Enter the array elements 11 13 17 19	All the elements of the given array are prime. The sum of the array elements is not a prime number

SET A

Problem 2 (Marks: 12)

Question
<p>Imagine yourself as a member of the SPL LAB project team, “UIU-ULTRON,” Your team wants to develop a student information management system for the UIU administration. This system will store and manage student records, including ID (int), Name (String), and CGPA (float). During a recent project meeting, one of your teammates proposed using structures to implement the system. However, the team wants to develop more complex features to secure a place in the project showcase. Unfortunately, you were absent from the feature finalization meeting, but your team has entrusted you with the coding responsibilities since you are good at writing functions and problem-solving.</p> <p>Finalized Features of the System:</p> <p>The system will present a menu with the following four options:</p> <ol style="list-style-type: none"> 1. Add New Student – Allows the user to input a student’s ID, Name, and CGPA and store it in the system. 2. Find Top Student (Highest CGPA) – Identifies and displays the student ID and name with the highest CGPA. 3. Find Average CGPA of Students – Calculates and displays the total number of students and their average CGPA. 4. Display All Students Information – Prints all students' ID, Name, and CGPA in the system. <p>One of your teammates provided a helpful hint regarding the formula for calculating the average CGPA.</p> $AverageCGPA = \frac{Sum\ of\ CGPA\ of\ all\ the\ students}{number\ of\ the\ students}$ <p>Now, it's your responsibility to implement the entire system efficiently.</p>

Sample Output:

===== Student Management System =====

1. Add New Student
2. Find Top Student (Highest CGPA)
3. Find Average CGPA of Students
4. Display All Students Information
5. Exit

Enter your choice: 1

Enter Student ID: 101

Enter Student Name: Sarah Zaman

Enter CGPA: 3.85

Student added successfully!

Enter your choice: 1

Enter Student ID: 102

Enter Student Name: Farhan Jabir

Enter CGPA: 3.90

Student added successfully!

Enter your choice: 2

Top Student:

ID: 102 Name: Farhan Jabir CGPA: 3.90

Enter your choice: 3

Total Students: 2

Average CGPA: 3.875

Enter your choice: 3

Student Information

ID: 101 Name: Sarah Zaman CGPA: 3.85

ID: 102 Name: Farhan Jabir CGPA: 3.90

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Problem 1 (Marks:13)

Write a C program that takes an array as input from the user. The program should perform the following tasks using the given functions:

1. **int print_common_divisors(int arr[], int size):**

This function should take an array arr and its size as input and display all the common divisors of the elements in the array.

2. **int isFamilyArray(int *arr, int size):**

This function should return 1 if the array is a **family array**, otherwise return 0.

An array is called a family array if the zeroth element divides the first element, the first element divides the second element, and so on, until the (n-2)th element divides the (n-1)th element.

For example the array {2,4,8,16} is a Family Array because the 0th element 2 divides the 1st element 4, the 1st element 4 divides the 2nd element 8 and finally the 2nd element 8 divides the 3rd and last element 16.

However, the array {15,90,45} is not a Family Array as though the 0th element 15 divides the 1st element 90, the 1st element 90 does not divide the 2nd element 45.

Sample Input	Sample Output
Enter the size of the array: 4 Enter the elements of the array: 2 4 8 16	Common divisors: 1 2 The array is a family array.

Enter the size of the array: 5 Enter the elements of the array: 3 6 18 36 72	Common divisors: 1 3 The array is a family array.
Enter the size of the array: 3 Enter the elements of the array: 15 90 45	Common divisors: 1 3 5 15 The array is not a family array.

SET B

Problem 2 (Marks: 12)

Imagine yourself as a member of the SPL LAB project team, “UIU-STRANGER.” Your team has been assigned to develop an Employee Attendance Management System for a company. This system will store and manage employee attendance records, including Employee **ID** (int), **Name** (String), and **Days_Present** (int).

During a recent project meeting, one of your teammates suggested using structures to implement the system. However, to make the system more functional and competitive, the team decided to add additional features to secure a place in the project showcase. Unfortunately, you were absent from the feature finalization meeting, but since you are good at writing functions and solving problems, your team has entrusted you with the coding responsibilities.

Finalized Features of the System

The system will present a menu with the following four options:

1. **Add New Employee** – Allows the user to input an Employee ID, Name, and Days Present and store it in the system.
2. **Find Most Inactive Employee** – Identifies and displays the Employee ID and Name of the employee with the lowest number of days present.
3. **Update Employee Name** - This will ask the user for Employee ID and New Name. Then, update the Name of the corresponding employee ID with the New Name.
4. **Display All Employees Information** – Prints all employees' ID, Name, and Days Present in the system.

Now, it's your responsibility to implement the entire system efficiently.

Sample Output:

===== Employee Attendance Management System =====

1. Add New Employee
2. Find Most Inactive Employee
3. Update Employee Name
4. Display All Employees' Information
5. Exit

Enter your choice: 1

Enter Employee ID: 101

Enter Employee Name: Jenin Ahmed

Enter Days Present: 25

Employee added successfully!

Enter your choice: 1

Enter Employee ID: 102

Enter Employee Name: Rafi Kabir

Enter Days Present: 15

Employee added successfully!

Enter your choice: 2

Most Inactive Employee:

ID: 102 Name: Rafi Kabir Days Present: 15

Enter your choice: 3

Enter Employee ID to update name: 102

Enter New Name: Rafi Rahman

Employee name updated successfully!

Enter your choice: 4

Employee Records:

ID: 101 Name: Jenin Ahmed Days Present: 25

ID: 102 Name: Rafi Rahman Days Present: 15