Lab 02 Tasks

Q1: Your assignment is to develop a C++ function that interchanges the values of two variables. Construct a recursive function called `recursiveSwap` that accepts two variables as arguments and swaps their values recursively.

Q2: Envision that you're assigned to create a program to handle a library's book inventory. Each book has characteristics such as `title`, `author`, `year of publication`, and `genre`. Construct a `struct` that accurately depicts a `book` as an entity in the real world. Then, using a programming C++, write a basic program that uses this `struct` to demonstrate the creation, modification, and display of book data.

1. Expand the program to manage an array of multiple books.
2. Develop a function to find a book by its title or author.
3. Enable the user to interactively input new books and update existing book data.

Q3: You're given an integer array and a target sum. Your job is to write a recursive function in C++ that checks if there's a subset of the array whose elements sum up to the target sum. ▪ Develop a recursive function named `hasSubsetSum` that accepts an integer array, the array's size, and a target sum as input and returns a `boolean` indicating whether a subset with the specified sum exists. ▪ The function should have the following signature: `bool hasSubsetSum(int arr[], int size, int targetSum)`.

Q4: Your task is to implement a basic Student Registration System in C++. Define two structures, `Register` and `Student`, where `Register` includes attributes `courseId` and `courseName`, and `Student` inherits from `Register` while having additional attributes such as `studentId`, `firstName`, `lastName`, `cellNo`, and `email`. Your objective is to create an array of `Student` structures to store data for five students. Write a C++ program that accomplishes the following tasks:

1. Implement the `Register` and `Student` structures.
2. Inherit the `Register` structure in the `Student` structure.
3. Create an array of `Student` structures to store data for 5 students.
4. Take input for each student, including their `courseId`, `courseName`, `studentId`, `firstName`, `lastName`, `cellNo`, and `email`.
5. Display the information for all 5 students.

Q5: Your assignment is to construct a basic product management system for an online store.

1. Develop a function that enables the addition of a new product to the system. The function should accept parameters such as `product name`, `price`, `quantity`, and any other relevant details.
2. Implement a function that takes a `product ID` as input and displays detailed information about the `product`, including its `name`, `price`, `quantity in stock`, and any other relevant details.
3. Design a function that allows the update of product information. It should accept a `product ID` and the new details (e.g., updated price, quantity, etc.) and modify the existing product's information accordingly.

Q6: You are asked to write a C++ program that calculates the Least Common Multiple (LCM) and Greatest Common Divisor (GCD) of two numbers. Implement two separate recursive functions, calculateLCM and calculateGCD, each handling the corresponding task.