University of Colombo School of Computing
SCS 1201 - Data Structures and Algorithms I

Take_Home Assignment 13 - 4th September 2023

- **Make a group of two members and answer the following questions.**
- **Upload your answer script as a .c file to the given link in the VLE on/before 10th September at 8pm.**

Note: Rename your .c files with your ***index number1_index number2_<question number>***

Ex: 20195245_20195247_Q1.c , 20195245_20195247_Q2.c1.

Only one submission per group is sufficient.

1. You are developing a student management system for a university. The system needs to sort student records based on multiple criteria: first, by their total marks in descending order, and in case of a tie, by their student IDs in ascending order. Each student's record contains their student ID, name, and marks in three subjects (Maths, Physics, and Chemistry). Implement a program that uses the selection sort algorithm to sort an array of student records according to the specified criteria.

   Here's the structure to represent a student record:

   ```
   struct Student {
   int id;
   char name[50];
   float mathMarks;
   float physicsMarks;
   ```

float chemistryMarks;

};

Write a function **selectionSortStudents** that takes an array of **struct Student** and the number of students as parameters, and sorts the records based on the given criteria. If two or more students have the same total marks, their order should be based on student IDs.

Additionally, write a function **printStudentArray** that takes an array of **struct Student** and the number of students as parameters and prints the sorted student records in the following format:

```
Sorted Student Records:
-----------------------
ID     Name              Math   Physics   Chemistry   Total Marks
-----------------------------------------------------------------
101    John Doe          95.0   88.0      92.5        275.5
205    Jane Smith        88.5   95.0      90.0        273.5
...    ...               ...    ...       ...         ...
```

Your program should allow the user to input the number of students and their details. After sorting the records, use the **printStudentArra**y function to display the sorted records to the user. Ensure that your code is well-structured and easy to understand, with meaningful variable names and comments explaining complex parts of the implementation.

2. Given an array of integers, sort the array using **merge sort** in-place. The array may contain **duplicate elements**, and the elements may be **negative**.

Note: Initialize the array with predefined values as given below instead of taking user inputs

Input array:

arr[] = -5 3 -2 3 2

Output array:

arr[] = -5 -2 2 3 3