CL-1002
Programming Fundamentals
Lab # 17

Objectives:

- String
- File Handling

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential.
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of **every task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **23F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your word file in this format **23F-1234_L1.docx**
12. Do not submit your assignment **after the deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

Problem: 1 | Reverse a String

Write a program that reverses a string. Use getline() for input a string.

Problem: 2 | Built-in functions String

Write a program to do the following operations on strings using string built-in function.

1. length(): Returns the length of the string.
2. substr(): Extracts a substring from the given string.
3. find(): Finds the position of a substring within the string.
4. append(): Appends another string or characters to the end of the current string.
5. Compare(): compare two strings

Problem: 3 | String

Write a function using string that accepts following arguments; A string and two integer that indicates the indexes (startIndex and stopIndex). Function will return a string which holds the section between the two indexes and return the null if it's not possible.
Example:
Entered string is "My name is ali"
Start index: 3
Stop index: 6
Function will return "name"

Problem: 4 | String

You are tasked with creating a simple program to validate names entered by users. The system should check whether the entered name follows certain rules:

The name should contain only alphabetic characters (no numbers or special characters).
The first letter of each word in the name should be capitalized.
The length of the name should be between 3 and 30 characters.

Problem: 5 | File Handling(Write file)

Write a c++ program that write in a file firstfile.txt your name, roll number and CGPA.
Example:
Name: XYZ
Roll Number: 21F-1111
CGPA:4

Problem: 6 | File Handling(Read file)

1. Write a c++ program that opens a already created file firstfile.txt (that you have created in above question).
2. Now read the data of file and display it. (Read the data until you reach end of file).
3. Now remove all the text from file.

Problem: 7 | File Handling(Read/Write file)

Write a program to add two numbers.
1. Write a c++ program that creates a file.
2. Ask user to input two numbers
3. Take their sum and store in variable.
4. Write both numbers and their sum in file.
5. Now read it from file and display

Problem: 8 | File Handling(Read/Write file)

Write a program to do arithmetic operations.
1. Write a c++ program that creates a file.
2. Prompt user to enter a number for writing its table, write the table in file you have created.
3. Now read your complete file. Display the contents of your file

Problem: 9 | File Handling(Read/Write file)

Write a program to initialize 100 randomly generated numbers. Sort all numbers in ascending order. Write all sorted numbers in file sortedNumbers.txt

Problem: 10 | Function Overloading

Design a set of C++ functions that demonstrate function overloading to calculate the final price of a product. Consider the following scenarios:

1. For regular products, the price is calculated based on the unit price and quantity ordered.
2. For discounted products, additional parameters such as the discount percentage need to be considered.
3. Some products may have a fixed shipping cost that needs to be added to the final price.
4. Special promotions might apply, affecting the total price calculation differently.

Create a set of overloaded functions that can handle these various scenarios and demonstrate their usage in a program that simulates adding different products to a shopping cart.

Problem: 11 | Function Overloading and pass by reference

You are developing a Math Quiz Generator program to help students practice basic arithmetic operations. The program should generate math quiz questions with different difficulty levels and formats. Design a C++ program with the following functionalities:

Generate a random addition question with two operands and display the result.
Generate a random addition question with three operands and display the result.

Generate a random subtraction question with two operands and display the result.
Generate a random multiplication question with two operands and display the result.
Generate a random division question with two operands and display the result.
Use function prototypes mentioned below

```
// Function to generate a random addition question with two operands
void generateAdditionQuestion();

// Overloaded function to generate a random addition question with three operands
void generateAdditionQuestion();

// Function to generate a random subtraction question with two operands
void generateSubtractionQuestion();

// Function to generate a random multiplication question with two operands
void generateMultiplicationQuestion();

// Function to generate a random division question with two operands
void generateDivisionQuestion();
```

Note: Use pass by reference only.

Problem: 12 | Function array pass by reference

You are working on a program that performs various operations on matrices. The program should include functions to handle matrix addition, matrix multiplication, and transpose. Design a C++ program with the following functionalities:

Read two matrices from the user.
Perform matrix addition and display the result.
Perform matrix multiplication and display the result.
Perform transpose of a matrix and display the result.
Use functions to implement each of these operations, and pass the 2D arrays representing matrices as arguments.
Function prototypes:

```
void readMatrix(int matrix[MAX_ROWS][MAX_COLS]);

// Function to display a matrix
void displayMatrix(const int matrix[MAX_ROWS][MAX_COLS]);

// Function to perform matrix addition
void addMatrices(const int matrix1[MAX_ROWS][MAX_COLS], const int matrix2[MAX_ROWS][MAX_COLS],
int result[MAX_ROWS][MAX_COLS]);

// Function to perform matrix multiplication
void multiplyMatrices(const int matrix1[MAX_ROWS][MAX_COLS], const int
matrix2[MAX_ROWS][MAX_COLS], int result[MAX_ROWS][MAX_COLS]);

// Function to perform transpose of a matrix
```

```
void transposeMatrix(const int matrix[MAX_ROWS][MAX_COLS], int result[MAX_COLS][MAX_ROWS]);
```

Best of luck

You are done with your exercise, submit on classroom at given time.