CSE102 – Computer Programming

Homework #5

Functions and Selection

Due Date: 21/04/2023

Hand in: A student with number 20180000001 should hand in a zip file named 20180000001.zip for this homework.

Homework Description: You will write a C file with the main function with three additional functions described below. Your program will start calling part1, part2, and part3 functions in that order. For each part, you will receive the inputs from the user and print the output to the console. Details of the parts are further discussed below. Please pay attention to the output format. Any deviation from the shared format may be penalized regardless of the correct execution.

Part 1. [30pts] Letter Frequency Problem

Develop a program that reads a text file and counts the occurrences of each letter in the English alphabet (case-insensitive). The program should use loops and pointer arguments to process the text file, and an array to store the counts. Implement a function to handle letter case conversion and print the results in a tabular format.

Expected Output:

```
Enter the file name: example.txt

Letter Frequency:
A: 12
B: 5
C: 3
...
Z: 0
```

Part 2. [30pts] Mixing Colors

Write a C program that defines an enumeration type called 'Color' with values RED, GREEN, BLUE, YELLOW, and ORANGE. Create a function called 'colorMixer' that takes two 'Color' enumeration values and a function pointer as arguments. The function pointer should point to a function that takes two 'Color' enumeration values and returns a new 'Color' enumeration value as a result of mixing the input colors.

Mixing two colors is done in the following way:

- First, each color is represented by a length-3 vector.

RED is [1, 0, 0]

GREEN is [0, 1, 0]

BLUE is [0, 0, 1]

YELLOW is [0.5, 0.5, 0]

ORANGE is [0.5, 0.4, 0.2]

- When the colors to be mixed has the following length-3 vectors [x1,x2,x3] and [y1,y2,y3], the mixed color is [(x1+y1)/2, (x2+y2)/2, (x3+yr)/2] and the corresponding enumerated color is the closest to this one using Euclidean distance.

Expected Output:

```
Enter Color 1 (r,g,b,y,o): g
Enter Color 2 (r,g,b,y,o): r
Mixed Color: YELLOW [0.5, 0.5, 0.0]
```

Part3. [40pts] Tic-Tac-Toe

Create a C program that simulates a two-player tic-tac-toe game using functions, loops, and if-else statements. The game should display the board, ask for each player's move, validate the input, and update the board accordingly. The game should also check for a winner after each move and end if there is a winner or if the board is full (indicating a draw). Your program should allow players to choose whether to play another game or exit.

Expected Output:

```
Player 1 (X), enter your move (row, col): 0 0
X _ _
_ _ _
_ _ _

Player 2 (O), enter your move (row, col): 1 1
X _ _
_ O _
_ _ _

Player 1 (X), enter your move (row, col): 0 1
X X _
_ O _
_ _ _

Player 2 (O), enter your move (row, col): 2 1
X X _
_ O _
_ O _

Player 1 (X), enter your move (row, col): 0 2
X X X
_ O _
_ O _

Player 1 (X) wins!
```

Note: Make sure to include appropriate comments and variable names in your code to make it easy to understand.

****Attach the photos of the outputs of the code to your file.**

****Do not forget to prepare a makefile (-50 points)**

General Rules:

1. We do not give you any function prototypes. We expect that you are experienced enough to understand when to use methods and name them. These will also be graded.
2. The program must be developed on given version of OS and must be compiled with GCC compiler, any problem which rises due to using another OS or compiler won't be tolerated.
3. Note that if any part of your program is not working as expected, then you can get zero from the related part, even it is working partially.
4. Zip your homework files before uploading them to MS Teams. The zip file must contain the C file with your solution and screenshots of the valid outputs of the program.
5. You can ask any question about the homework by sending an email to barisozcan@gtu.edu.tr or by using the homework channel on MS Teams page of the course.