UNITED INTERNATIONAL UNIVERSITY (UIU)

Department of Computer Science and Engineering (CSE)

FINAL EXAMINATION **SPRING, 2025**
DURATION: 2 HOURS **FULL MARKS: 40**

CSE 1111: Structured Programming Language

Answer **all 5 (five)** questions. Figures in the right margin indicate full marks of questions.

[Any examinee found adopting unfair means will be expelled from the trimester/program according to UIU disciplinary rules.]

1. Solve any **two** of the following three problems. $4+4$

   a) The **factorial** of a number n, denoted as $n!$, is the product of all positive integers from 1 to n. For example, $5! = 5 \times 4 \times 3 \times 2 \times 1$.

   Evaluate whether the following function is correct or not. Explain your answer briefly.

```
int factorial(int n)
{
    return (n-1) * factorial(n);
}
```

   Note: It is guaranteed that n will not be negative.

   b) Write a code in C to remove adjacent duplicate characters from a string.

"Sample Input"	"Sample Output"
AABBBCDDD	ABCD
CDDC	CDC

   c) Determine the output of the following C code snippets.

```
char s1[15] = "C";
char s2[15] = "Programming";
strcat(s1, s2);
printf("%s %s", s1, s2);
```

```
char str1[] = "Hello";
char str2[] = "Hello\0Everyone";
printf("%d", strcmp(str1, str2));
```

2. Read the instructions carefully and write the functions. $4+4$

   a) Write a function `celsius_to_fahrenheit` that takes a temperature in Celsius as a parameter and returns the equivalent temperature in Fahrenheit.

   Use the formula: $F = C \times \frac{9}{5} + 32$.

   b) Write a `main` function that takes the air temperature (in Celsius) as input, converts it to Fahrenheit using the function from (a), and then categorizes the weather based on the following table:

Temperature in Fahrenheit	Weather Category
Below 68	Cold
68-82.4	Moderate
Above 82.4	Hot

3. Write a C program to: 8

- Input an $N \times N$ matrix.
- For each row, find the difference between maximum and minimum element.
- Print the largest difference among all rows.

Sample Input & Output:

Input	Output
Matrix size: 3 5 2 9 1 6 1 7 8 7	Maximum row difference: 7

Explanation:

- Row 0 max = 9, min = 2 ⟶ difference = 7
- Row 1 max = 6, min = 1 ⟶ difference = 5
- Row 2 max = 8, min = 7 ⟶ difference = 1
- Maximum difference among these is 7

4. a) Define a structure named `Color` that stores the `name` (at most 30 characters), `red_intensity`, `green_intensity` and `blue_intensity` of a color. 2

   b) Write a function named `get_brightness` that takes a `Color` structure as input and returns its brightness. 3

   The brightness of a color is calculated as the average of the red, green, and blue intensity values:

$$\text{brightness} = \frac{\text{red} + \text{green} + \text{blue}}{3}$$

   c) Write a `main` function that contains an array of `Color` structure elements. Initialize the array with the following values. Then, find the name of the brightest color among them. 3

Color Name	Red Intensity	Green Intensity	Blue Intensity
Crimson	220	20	60
Royal Blue	65	105	225
Lemon Yellow	255	244	79
Emerald Green	80	200	120
Pink	255	192	203

5. a) Determine the output of the following C code segment. 4

```c
#include <stdio.h>
void process(int *p){
    for(int i=0;i<4;i++)
        if(*(p+i)%2==0) *(p+i)*=*(p+i);
}
int main(){
    int a[]={1,2,3,4};
    process(a);
    for(int i=0;i<4;i++) printf("%d ",a[i]);
    return 0;
}
```

b) The file `"input.txt"` contains 5 floating point numbers. Write a program that reads the 5 numbers and prints the average of all numbers in another file `"output.txt"`. Assume that the source code and the text files are in the same folder. 4

“input.txt”	**“output.txt”**
1.5 2.0 3.1 4.0 5.7	3.26
10.0 15.2 20.0 25.0 30.8	20.2