NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES ISLAMABAD CAMPUS

PROGRAMMING FUNDAMENTALS (CS118) – FALL 2018

ASSIGNMENT-6

Due Date: November 25, 2018 (11:30pm)

Instructions:

1. *Write the C++ programs for all the question.*
2. *Solution to all the problems should be written in a separate (.cpp) file.*
3. *Submit the source code via **Google classroom**. Submissions via email will not be accepted.*
4. *Use proper naming convention to name the file containing source code. For example, the file containing the source code for first question of the first assignment should be named as i18xxxx_assignment4_q1.pp, replace i18xxxx with your roll number.*
5. ***The output should be well presented.** There will be marks of the presentation.*
6. ***Use proper checks where required**. There will be marks of proper checks too.*
7. *Do not **plagiarize**. Use efficient, simple and clean logics and codes.*
8. *Use proper **indentation** in your code. Indentation improves **readability** and helps in **debugging**.*
9. *Use appropriate naming conventions for **variable names**.*
10. *Note: You have to follow the submission instructions to the letter. Failing to do so can get a zero in assignment. We are not going accept any file without the specified naming convention whatever the reason will be.*

Keep calm and start your coding now ☺

1. Write a Menu Driven C++ program that creates a two-dimensional array/Matrix of size **3 X 3** and initialize it with user. The program should do following Tasks using Menu, The menu operations are implemented using functions:

- **Total** : Calculate the total/sum of all the values in the array.
- **Average:** Calculates average of all the values in the array.
- **RowTotal**: Calculates total/sum of the values in the specified row.
- **ColumnTotal**: Calculates total/sum of the values in the specified column.
- **HighestInRow**: Finds highest value in the specified row of the array.
- **LowestInRow:** Finds lowest value in the specified row of the array.

- **Transpose:** Find Transpose of array.
- **LeftDiagonalTotal:** Calculates total/sum of the values in the left Diagonal of array.
- **RightDiagonalTotal: :** Calculates total/sum of the values in the right Diagonal of array.
- **Multiply:** Take another 3 X 3 array as input from user and Multiply both.

Note: Make all code separately and then merge them all in a menu. Use switch statement for menu.

2. Write a Menu Driven C++ program that creates a character array/string by taking input from user and perform following tasks by displaying menu to user, The menu operations are implemented using functions:

- **Calculate length of string.**
- **Count number of words in string.**
- **Check a string is palindrome or not.**
- **Find a word within the array. If found display its starting position.**
- **Convert a string in lowercase.**
- **Convert a string in uppercase.**

Note: Make all code separately and then merge them all in a menu. Use switch statement for menu.

3. Write a function that takes an input integer argument and displays the binary equivalent of this number.

4. Write a function that take the array of Programing fundamentals marks as input parameter and gives the mean, median, mod and standard deviation to caller function.

5. Write a function to find the norm of a matrix. The norm is defined as the square root of the sum of squares of all elements in the matrix.

NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES ISLAMABAD CAMPUS

PROGRAMMING FUNDAMENTALS (CS118) – FALL 2018

ASSIGNMENT-6

---

6. Write a function to compute the distance between two points and use it to develop another function that will compute the area of the triangle whose vertices are **A(x1, y1)**, **B(x2, y2)**, and **C(x3, y3)**. Use these functions to develop a function which returns a value 1 if the point **(x, y)** lines inside the triangle ABC, otherwise a value 0.

7. Write a function that takes an array and element to search in the array and returns the index of element if the element is found. And return the negative number if not found. Implement the function as using a) linear search and b) binary search.

8. Given an array **p[5]**, write a function to shift it circularly left by two positions. Thus, if p[0] = 15, p[1]= 30, p[2] = 28, p[3]= 19 and p[4] = 61 then after the shift p[0] = 28, p[1] = 19, p[2] = 61, p[3] = 15 and p[4] = 30. Call this function for a (4 x 5) matrix and get its rows left shifted.

9. For the following set of n data points (x, y), compute the correlation coefficient r, given by

$$r = \frac{\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

You need to write your summation function to calculate sigma.

10. Write a C++ function naming mysin() which take the input number and return the sin of the number . Sin of the number is evaluated using the series

$$\sin(x) = x - (x^3/3!) + (x^5/5!) - (x^7/7!) + \cdots$$

11. Implement the Tic-Tac-Toe game in C++ using functions and 2D array of 3X3 size.

Rules of the Game

- The game is to be played between computer and user.
- One of the player chooses ‘O’ and the other ‘X’ to mark their respective cells.
- The game starts with one of the players and the game ends when one of the players has one whole row/ column/ diagonal filled with his/her respective character (‘O’ or ‘X’).
- If no one wins, then the game is said to be draw.

NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES ISLAMABAD CAMPUS

PROGRAMMING FUNDAMENTALS (CS118) – FALL 2018
ASSIGNMENT-6

The moves taken by the computer is implemented by using rand() function. User will enter the Row and Colum number to place “O” or “X” on the board.

After the moves of both players you need to check whether any row or colum or diagonal is crossed by same player. You need to write functions for rowCrossed() , columCrossed() and diagonal crossed for this. Also write a function that will indicate whether the game is over with or without any player.

Implement the game and make any suitable functions whenever need in your program.