**Programming Fundamentals (CS 1002)**

**FALL 2021 ASSIGNMENT # 5**

**Due Date: Thursday, December 11, 2021 (11:59 pm)**

**Instructions**

Please follow the following submission instructions. Failure to submit according to the above format would result in deduction of 10% marks. Submissions on the email will not be accepted.

* Combine all your work (solution folder) in one .zip file. Use proper naming convention for your submission file. Name the .zip file as **SECTION\_ROLL-NUM\_05.zip** (**e.g.** **T\_21i0412\_05.zip**). Your zip file should only contain **.cpp** files, each file should correspond to its question/problem number. Submit .zip file on Google Classroom within the deadline.

**Plagiarism:** Plagiarism cases will be strictly dealt with. If found plagiarized, both the involved parties will be awarded zero marks in this assignment, all of the remaining assignments, or even an **F grade** in the course. Copying from the internet is the easiest way to get caught!

**Deadline:** The deadline to submit the assignment is **Thursday, December 11, 2021 (11:59 pm)**. Late submission with marks deduction will be accepted. Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

**Marking criteria:** Your submitted programs will be marked on the following criteria.

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| Functional requirements | 50% |
| Good user interface (user friendly instructions, layout, presentation) | 20% |
| Proper source code indentation | 10% |
| Programming conventions followed (e.g. variable names, ) | 20% |

**Note:** Start early so that you can finish it on time

**Problem 1 (20 marks):**

Suppose A and B are arrays of size M and N respectively. Write a C++ program that creates a third array C whose size is M + N and populates it such that the following sequence is followed.

* All even number of A from left to right are copied into C from left to right
* All odd numbers of A from left to right are copied into C from right to left.
* All even numbers of B from left to right are copied into C from left to right.
* All odd numbers of B from left to right are copied into C from right to left.

Sample Input:

A = {3, 2, 1, 7, 6, 3}

B = {9, 3, 5, 6, 2, 8, 10}

Expected Outcome:

C= {2, 6, 6, 2, 8, 10, 5, 3, 9, 3, 7, 1, 3}

**Problem 2 (20 marks):**

Write a program that reads a line of text from the keyboard using getline() function. Convert the user entered line to upper case without using built-in functions (hint: ascii of a=97 and A=65 => 97-32=65). Finally, print a table indicating the number of occurrences of each alphabet in the text. Assume that the input string can only contain English alphabets and occurrence of a character should be displayed only once.

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| Enter a line of string: To be or not to be that is the question  In capital case : To be or not to be that is the question  T 6  O 5 (note that occurrences of O is listed only once)  B 2  E 3  R 1 |

**Problem 3 (50 marks):**

Write a Menu Driven C++ program that creates a two-dimensional array/Matrix of size 3 X 3 and initialize it with user input. The program should do following Tasks using Menu:

* 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: Make another 3 X 3 array and assign random values (between 1 and 50) to its elements. Then Multiply the user entered array with this new array.

Program requirements:

* Make function for each operation; for example RowTotal() function will get 1) array 2) its size and 3) specify row number as arguments and returns the total of the specified row.
* Use switch statement for menu.
* Your program should ask user “Do you want to continue?” and repeat the program unless user enters ‘N’.

**Problem 4 (20 marks):**

Write a C++ program that creates two arrays, get their values from user, and then compare them. The program should print:

* “Arrays are equal” if both have same elements in same order
* “Arrays are not equal” if even one element mismatch
* “Array are not equal but have same elements” if elements are same but order does not match.

A = {1, 2, 3, 4, 5, 6} and B = {1, 2, 3, 4, 5, 6} => Arrays are equal

A = {1, 2, **3**, 4, 5, 6} and B = {6, **8**, 1, 2, 4, 5} => Arrays are not equal

A = {1, 2, 3, 4, 5, 6} and B = {6, 3, 1, 2, 4, 5} => Array are not equal but have SAME elements

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| *Hint (you are free to use a different logic): Think of searching the first element of A in B (and all other elements one by one). If it is* ***not*** *found in array B then A and B are not equal and we don’t need to test more. In case it is found, then A and B could be tested for EQUAL or SAME. A and B will be equal as long as index of the searched element in B is same as of A (and this will be tested for all elements). Otherwise, element of A is found in B but at different index concludes for SAME but not EQUAL possibility.* |

😊 Happy coding: Start you coding now 😊