Programming Fundamentals (CS 1002)
FALL 2022 ASSIGNMENT # 4

Due Date: Sunday, November 20, 2022 (11:59 pm)

Instructions

Please follow the following submission instructions. Failure to submit according to the above format would result in a deduction of 10% marks. Submissions other than Google classroom (e.g., email etc.) will not be accepted.

- Combine all your work (solution folder) in one .zip file. Use a proper naming convention for your submission file. Name the .zip file as **PROGRAM SECTION_ROLL NUM_02.zip** (**e.g., BS(DS/AI)_A_22I_1234_02.zip**). Your zip file should only contain **.cpp** files, and each file should correspond to its question/problem number. Submit a .zip file on Google Classroom within the deadline.
- The student is solely responsible for checking the final .cpp file for issues like corrupt files, viruses in the file, or mistakenly exe sent. If we cannot download the file from Google Classroom, it will lead to zero marks in the assignment.
- The displayed output should be well-mannered and well presented. Use appropriate comments and indentation in your source code.
- If there is a syntax error in the code, zero marks will be awarded in that part of the assignment.
- **You are NOT allowed to use any built-in functions and global variables.**

Deadline: The deadline to submit the assignment is **Sunday, November 20, 2022 (11:59 pm)**. No late submission will be accepted. Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

Grading Policy

1. Program with no compiler error (10%)
2. Functional requirements (50 %)
3. Good user interface (user-friendly instructions, layout, presentation) (15%) 4. Proper source code indentation (10%)
5. Programming conventions followed (e.g., variable names) (15%)

Honor Policy

This assignment is a learning opportunity that will be evaluated based on your ability. Plagiarism cases will be dealt with strictly. If found plagiarized, both the involved parties will be awarded zero marks in this assignment, all the remaining assignments, or even an **F grade** in the course.

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

Question 1:[10 marks]

Write a function that takes in three arrays (X,Y,Z) and return an array (P).

Suppose X, Y, Z, P are arrays of integers of size M, N, X, and M+N+X respectively. The elements

in array X,Y,Z appear in ascending order. Write a C++ program to produce fourth array

P by merging elements arrays X,Y,Z in descending order. Example:

Array X is {1,3,5,6}

Array Y is {2,4,8}

Array Z is {10,0}

Array P should be {10,8, 6, 5, 4, 3, 2, 1,0}

Note: Do not use Merge then sort strategy. Array P should be merged in sorted order.

Question 2: [20 marks]

Write a program for recording the sales of a restaurant. You would need to display a menu along with price. Before choosing an item from the menu, the program will ask for user's name, afterwards the user will choose his/her desired items along with quantity. You need to record each item in the database shown below:

Name	Item	Quantity	Cost
Ali	Fish & Chips	2	100
Ali	Burger	1	150
Rayyan	Chips	1	250
Rayyan	Juice	1	80

Your program should be able to handle orders from multiple customers, and each user can ask as many items as possible. **And there can be multiple person with same user name**. After taking orders from all the customers, the program will display analytics menu. The analytics page should have the following options:

- ➔ Display the entire records. (It would display all the data as shown above)
- ➔ Average sales of an item. (It would calculate the average sales(cost) of any given item)
- ➔ Total sale for a user name. (Calculate the total sale for specific user name)
- ➔ Count of an item for a user name.
- ➔ Median Quantity for a specific Item.

You would need to use arrays and functions in this program and handle input validation as well.

Question 3: [10 marks]

Write a function to display the maximum number in each window. The window size would be defined by the user at runtime, and each window will slide in the array to find the maximum.

Input: arr[] = [4, 3, 8, 9, 0, 1], k = 3

Ouput: 8,9,9,9

You need to handle all the odd scenarios in this task

Question 4: [10 marks]

Write a program and code the following functions:

- removePunctuationMarks(input text): this function would take an input string and remove all the punctuation marks and special characters from the text
- removeStopWords(input text): this function would take an input string and remove all the stop words and return the filtered string. For example:

text	**stopwords**	**Output**
blue car and blue window	[and]	blue car blue window
black crow in the window	[in, the]	black crow window
i see my reflection in the window	[i, my, in, the]	see reflection window

Question 5: [10 marks]

Write a program to input two arrays and add both of them. The user will keep on taking input until it presses Q. The size of both the arrays can vary. In case of different size, just pad the smaller array with zeroes. You need to create a function for vector addition, and you are not allowed to use any dynamic memory allocation in this task.

Question 6: [10 marks]

Write a function where the function will take two arrays (arr1 and arr2) of size N as input, and both the elements will be merged by placing the elements of both arrays at an alternative position in a third array arr3 of size 2N. After the merge, the function will sort the array, and you would need to display the sorted array, and for each element mention whether it was from array.

Input : Arr1 is {1,3,8,10}

Arr2 is {2,4,5,6}

After Merge

Arr3 would be {1, 2, 3, 4, 8, 5, 10, 6}

Output:

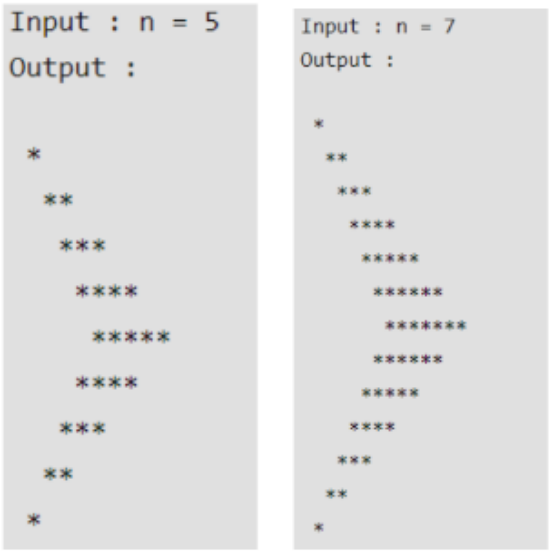
- ➔ 1 arr1
- ➔ 2 arr2
- ➔ 3 arr1
- ➔ 4 arr2
- ➔ 5 arr2
- ➔ 6 arr2
- ➔ 8 arr1
- ➔ 10 arr1

Bonus Task: [10 marks]

Print the following pattern without using any loops, and it should work for any given number.

It should be generic

(A) Arrow Shape (with size N)



*****Good Luck*****