National University of Computer and Emerging Sciences

Assignment No. 4

Programming Fundamentals

CS1002

Fall 2022

Deadline: 28-Nov-2022, 04:45PM

Department of Computer Science

Submission Instructions:

- All problems must be solved by following the order and submitted in .cpp file in zip folder and also have to submit the word file (.docx) otherwise marks will be deducted. The folder name should be XXXX_A04.zip. Where XXXX is your roll number.
- Every .cpp file must be named after the question number i.e. Q1.cpp, Q2.cpp
- Printed assignment will get you zero marks.

- This is an individual assignment.
- **Plagiarism is strictly prohibited.**

Q1	10

Write a program to print out all Armstrong numbers between 1 and 600. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number.

For example, 153 = (1 * 1 * 1) + (5 * 5 * 5) + (3 * 3 * 3)

Q2	10

Write a program that has an array of 100 integers. Populate this array with numbers between 100-10000 both included. Then print out all Armstrong numbers in this array.

For example, 153 = (1 * 1 * 1) + (5 * 5 * 5) + (3 * 3 * 3)

Q3	10

Create a menu based program to print different shapes. Take appropriate inputs from the user according to the shape.:

- Filled/Hollow Square
- Filled/Hollow Triangle
- Filled/Hollow Rhombus
- Filled/Hollow Rectangle
- Filled/Hollow Parallelogram
- Exit

Your program should provide user with proper menu to select shape and type of shape and the menu should provide forward and backward options for the rhombus or parallelogram to tilt. Rhombus is a tilted square and Parallelogram is a tilted rectangle. In Rhombus add a space after every * to make it look beautiful.

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 * * *          * * *
 * * *    OR     * * *
* * *             * * *

 *******          *******
 *******   OR     *******
*******           *******
```

Q4	10

Convert the above given program to populate the desired pattern in a 2-D array and then print the array to display the pattern. The array will be 20*20. So a shape of max 20*20 can be populated. Write down

appropriate checks on the input. **It must be a menu driven program and will not end until the user selects to exit.**

Q5	10

The use of computers in education is referred to as *computer- assisted instruction* (*CAI*). Write a program that will help an elementary school student learn multiplication. Use the rand function to produce two positive one-digit integers and the operation as well. The program should then prompt the user with a question, such as if integers are 6 and 7 then program will ask:

"6 * 7 = ?"

Or

"6 - 7 = ?"

The student then inputs the answer. Next, the program checks the student's answer. If it's correct, display the message "Very good!" and ask another multiplication question. If the answer is wrong, display the message "No. Please try again." and let the student try the same question three times or if the student gets it right.

In the end the student will be given a report about his test.

Each question will be displayed with the correct answer.

It will also show on which attempt the answer was correct or was incorrect in all three

Will provide the summary of first, second and third attempt correct answers.

Q6	10

Inverse of a matrix is a matrix A is a matrix A^{-1} such that A x A^{-1} = I. Where I, is an identity matrix. You are required to write down a code that will take the input of an n*m matrix A and another m*n matrix B. Will tell if B is inverse of A or not. Use proper output statements to get the input of the matrices with the certain dimensions.

Hint: Try matrix multiplication.