National University of Computer and Emerging Sciences, Lahore Campus

Course:	**Programming Fundamentals**	**Course Code:**	**CS 1002**
Program:	**BS (CS)**	**Semester:**	**Fall 2023**
Due Date	**15-OCT-2023 at 11:59 pm**	**Total Marks:**	**60**
Section:	**1E & 1J**	**Page(s):**	**4**
Type:	**Assignment 2**		

Important Instructions:

1. You have to upload only .cpp file. Assignment in any other format (extension) will not be accepted and will be awarded with zero marks. You have to make a zip file and upload it onto the google classroom submission folder. For question 1, name your solution file with your roll number, i.e., Q1_23L_1111.cpp. Similarly, you can name other questions.
2. You are not allowed to copy solutions from other students. We will check your code for plagiarism using plagiarism checkers. If any sort of cheating is found, negative marks will be given to all students involved.
3. Late submission of your solution is not allowed

Question 1: [Total Marks 5]

A common multiple is a number that is a multiple of two or more numbers. The common multiples of 3 and 4 are 0, 12, 24, ... and so on. The least common multiple (LCM) of two numbers is the smallest non-zero number that is a multiple of both hence LCM of 3 and 4 is 12, similarly LCM of 12 and 18 is 36.

LCM, GCD and Multiplication of Two Numbers
LCM, GCD and the product of the two numbers N1, N2 are associated with a following equality

N1 x N2 = LCM (N1, N2) x GCD (N1, N2)
Using the above equality relation we will find the LCM of the the two numbers.

Problem: find LCM of two numbers.
So you have to write code for finding **LCM** of two numbers.

Question 2: [Marks: 5]

Find three consecutive numbers whose multiplication is equal to the Required Number, (Your program should prompt for the number N and outputs 3-numbers those if we multiply equals to N. Also if there isn't any 3–tuple of numbers then it should say NO).

Question # 3 [Marks: 3+3=6]

Part A:

Write a program that keeps on taking input from user, until the user enters -1 and tell whether the input number is a complete square or not. Perfect square means that if any number multiplies with its own.

Output:

```
Enter a number to know is a perfect square : 25
 The number is a perfect square.
Enter a number to know is a perfect square : 16
 The number is a perfect square.
Enter a number to know is a perfect square : 23
 The number is not a perfect square.
Enter a number to know is a perfect square : -1
```

Part B:

Modify your program to such that until user enters -1 it keeps on asking Numbers and telling side by side the number is Perfect Square of which number.

Question # 4: [Marks: 5+5=10]

Part A:

Write a Program which finds a triplet a, b and c (3 integers) whose sum satisfies this: $a^2+b^2+c^2=1000$

Output:

```
0 + 632 + 368 = 1000
0 + 633 + 367 = 1000
0 + 634 + 366 = 1000
0 + 635 + 365 = 1000
0 + 636 + 364 = 1000
0 + 637 + 363 = 1000
0 + 638 + 362 = 1000
0 + 639 + 361 = 1000
0 + 640 + 360 = 1000
0 + 641 + 359 = 1000
0 + 642 + 358 = 1000
0 + 643 + 357 = 1000
0 + 644 + 356 = 1000
0 + 645 + 355 = 1000
0 + 646 + 354 = 1000
0 + 647 + 353 = 1000
0 + 648 + 352 = 1000
```

Part B:

Write a Program which Prints all the triplet a, b and c which satisfies this: a+b+c = 1000.

Question 5: [Marks: 5]

Write a program that takes inputs until the user enters -1 and your program tells the frequency of even and odd numbers.

Question 6: [Marks: 5]

Write a program which adds all the natural numbers below 3000 and greater than 500 that are multiples of 3 or 5 but not both.

Question 7: [Total Marks 14=5+3+3+3]

I. Write a program that takes input **'k'** from the user which means the user is interested in **k Fibonacci numbers** and then ask again one by one these **k** Fibonacci numbers who wants to know.

Input Format:

How many Fibonacci Numbers you want to ask: 3
Which Fibonacci: 6
F6= 8
Which Next Fibonacci: 3
F3 = 2
Which last Fibonacci you want to ask is: 4
F4 = 3

II. Write a program which takes input '**T'** from user and prints all the **Fibonacci numbers less than T**.

Sample Input:	**You want to Print Up to:**	**50**
Sample Output:	**The Sequence Up to <50 is:**	**0, 1, 1, 2, 3, 5, 8, 13, 21, 34**

III. Write a program which takes two input from user **Start** and **End** and prints all the Fibonacci numbersbetween them.

IV. By considering the terms in the Fibonacci sequence whose values do not exceed four million,find the sum of the even-valued terms.

Question 8: [Total Marks 10]

We want to make a special calculator that can calculate the age of any person. As we know that for calculating any person's age we must have one's date of birth and also we must know the current date. We must have to be careful about the validity of the two dates. After validating the two dates we need to subtract the two dates in a very particular fashion.

Tasks:

I. **Data Validation Check—**the first thing that we need to watch out for is that if both dates are correct or not.

Note: While coding we need to make sure that next step which is calculating age, will only be triggered when the above entered dates are valid. In case if the entered values are invalid then our program must take the input again until the valid input is entered.

II. Calculating Age:

Let us suppose that we have a date 28-09-2000 as a Date of Birth and 13-02-2017 as a Current Date.

13-02-2017
28-09-2000

As we can see we cannot subtract days because 13 is less than 28 so we will take carry from months. As previous month is January and it has 31 days so we will add 31 in 13 which will be 44 now our days will be (44-28=16). Same procedure with months that we can not subtract 9 from 2 so will take carry from Year. It means we will add 12 in 2 and it will be 14. Now our months will be (13-9=4) and now the years can be subtracted easily(2016-2000=16)
So the Age is 16 years 4 Months and 16 Days.

Note: While writing the code we need to remember these things that if we want a carry from previous month and that month is January then we will add 31 days (because January has 31 days), if it is April then we will add 30(because April has 30 days).