**National University of Computer & Emerging Sciences, Karachi** **Fall 2023 (School of Computing)   
Assignment # 1**

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| **Course Code:** CS-1002 | **Course Name:** Programming Fundamentals | |
| **Course Instructors:** Mr. Muhammad Shahzad, Dr. Farooque Hassan Kumbhar, Dr. Abdul Aziz, Mr. Syed Zain Ul Hassan, Mr. Basit Ali, Ms. Sobia Iftikhar | | |
| **Open Date:** September 10, 2023 | | **Deadline:** September 18, 2023 (11:55 AM) |

**Important instructions:**

* You must never share your assignment with anyone. If any part of your assignment is found to be copied, then you will be awarded **0** marks as per the university policy.
* The assignment must be submitted before the deadline.
* Carefully read the submission instructions given below.

**Submission:**

* Create a separate folder for each of the tasks. You must write your solution by hand and then create its *pdf* file for submission.
* Create a main folder and rename it in the format “***k23-xxxx***” (replace **xxxx** it with your actual student ID). Then place all the separate folders for different tasks in this main folder.
* The main folder is to be submitted on Google Classroom.

**Marks distribution:**

* Task 1 (a): 5 points
* Task 1 (b): 5 points
* Task 2: 5 points
* Task 3: 15 points
* Task 4: 10 points
* Task 5: 10 points  
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  **Max points:** 50

**Task 1 (a):**

Create an algorithm and then write pseudocode for the following problems:

1. To find Greatest Common Divisor (GCD) of two given numbers.
2. start
3. declare four integers I, num1, num2, c\_factor
4. get num1, num2
5. set I = 1
6. BY CHAT GPT
7. Start the program.
8. Declare integer variables **i**, **num1**, **num2**, and **c\_factor** to store the loop control variable, the two input numbers, and the common factor (GCD) respectively.
9. Display the message "Enter num1: " to prompt the user to enter the first number.
10. Read and store the first number in the variable **num1** using **scanf**.
11. Display the message "Enter num2: " to prompt the user to enter the second number.
12. Read and store the second number in the variable **num2** using **scanf**.
13. Initialize the loop control variable **i** to 1.
14. Enter a **while** loop with the condition **while (i <= num1 && i <= num2)** to find the GCD of the two numbers. This loop will iterate until **i** is less than or equal to both **num1** and **num2**.
15. Inside the loop, check if both **num1** and **num2** are divisible by **i** (i.e., **num1 % i == 0** and **num2 % i == 0**). If they are, update the **c\_factor** with the value of **i**, as this is a common factor.
16. Increment the loop control variable **i** by 1.
17. After the loop terminates, print the GCD (common factor) of the given numbers using **printf** with the message "GCD of given num is: %d" and the value of **c\_factor**.
18. End the program.

Pseudo code by chat gpt

Start

2. Declare variables: i, num1, num2, c\_factor

3. Display "Enter num1: "

4. Read num1 from the user

5. Display "Enter num2: "

6. Read num2 from the user

7. Set i = 1

8. Initialize c\_factor = 0

9. While (i <= num1) AND (i <= num2):

a. Check if (num1 % i == 0) AND (num2 % i == 0):

i. If true, set c\_factor = i

b. Increment i by 1

10. Display "GCD of given numbers is: ", c\_factor

11. End

1. To take 3 numbers A, B and C as input and find if the sum of numbers A and B is greater than the number C.

Algortihm

1. Declare four variables A,B,C and sum so that the integers can be stored in these variables and sum of A and b will be stored in var sum
2. Display “Enter first number ”to user so that the use can enter number
3. Store entered integer in var A
4. Repeat step 2 and store integer in var B
5. Repeat step 2 and store integer in var c
6. Store the sum of variables a and b in variable c
7. If sum > c then
   1. Display “sum is **greater** than c”

Else if sum = c then

Display “sum is equal to c”

Else

Display “sum is less than c”

Endif

1. Stop

Pseudo Code

Declare variables a b c and sum in integer

Display “enter first num”

Read a from user

Display second num

Read b from user

Display third num

Read c from user

Set sum = A +B

Start

if Sum > C then

Printf(“A+B is greater than C”);

Elseif sum == C

Printf(“sum of A+B is equal to c”)

else

Printf(“A+B is less than C”)

Endif

1. To find the smallest number in a given list of 10 numbers.
   1. Algortihm
2. Given a list of 5 numbers, rearrange them in descending order.
3. To find the number of even integers in a given list of numbers.

**Task 1 (b):**

For each of the problems given in Part(a), draw a detailed flowchart.

**Task 2:**

For each of the following variables, write the most appropriate data type. Also provide a brief reason for selecting the data type.

1. Age
   1. Int as int datatype allows us to enter data In two or more numbers. We usually use numbers for age
2. Temperature
   1. Float as it provides us 6 decimal places with precision, and in temperature we have to consider values after decimal
3. Longitude
   1. Float as for longitude there are 6 precision values after decimal, we can use float to store value of longitude
4. Third letter of your name
   1. Char as it allows you to store one character at a time
5. Wind speed
   1. Int because we usually not consider values after decimals in wind so int datatype allows us to store numbers

**Task 3:**

Mr. Rahim works at the cash counter of a retail store. For every customer he serves at the counter, he asks for their name and counts the items they bought. For each of these items he adds the price to the customer’s bill, with that bill also containing the customer’s name. If the bill exceeds 10k, Mr. Rahim is obliged to give the customer a 5% discount. Also, at the end of the day, Mr. Rahim should write the total revenue for the day i.e., the grand total of all the bills combined.

Draw a detailed flowchart for Mr. Rahim’s activities.

**Task 4:**

Write a program that takes an integer, as an input from its user and print its binary equivalent value on screen. You are required to write the pseudocode or algorithm or flowchart to show the pre-programming process along with the code written in C program.

**Task 5:**

Mr. Salman ran a small grocery business. He works on 15% profit on sale of each item. He also deduct 18% GST on each sale that he made. Write a program that prompt user to input price of five items individually and then print the sales receipt including all necessary details as shown below:

**OUTPUT:**

SALMAN grocery Store

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Description | Price

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Item 1 | 25

Item 2 | 165

Item 3 | 200

Item 4 | 350

Item 5 | 75

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Item Total | 815

G.S.T | 146.7

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Grand Total | 961.7

Total Profit Earned | 122.25

**Required:**

1. pseudocode or algorithm or flowchart
2. Code written in C program for the above given output. (Hint: you need to use format specifier, escape sequence and operators.)