

**NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES
ISLAMABAD**

**Programming Fundamentals (CS 1002)
FALL 2021 ASSIGNMENT # 1**

Due Date: Thursday, September 30, 2021 (4:00 pm)

Instructions

Submission: Assignment is divided into two parts. Part I consists of pseudocode and flowchart questions; it has to be hand-written. Part II consists of C++ programming questions. 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.**

- **Part I:** Submit this part to your respective instructor, if you do not have PF class on 30th you can drop it in his/her office. Make sure that you have clearly mentioned your Name, Registration Number and Section on the front page.
- **Part II:** 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_04.zip** (e.g. **A_21i0412_04.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 dealt with strictly. 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 **30th September 2021 at 4:00 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.

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

PART I – Pseudocode, Flowcharts and Dry runs

(You have to do 2 dry runs of each problem in this part and draw flowcharts of the problems where decision/repetition structures are required)

Convention for writing pseudocode: Please use the given keywords for pseudocode questions for the sake of consistency in all submissions

Keyword	Usage
//	For comments
Display	Prompts e.g. Display "Hello world"
Declare	Declaring variables e.g. Declare Integer <i>variable_name</i>
Integer	To declare integers
Real	To declare real numbers
Character	To declare characters
String	To declare strings
Input	To take input from the user e.g. Input <i>variable_name</i>
Arithmetic operators	+, -, *, /, MOD
Relational operators	<, >, <=, >=, ==, !=
Set	To update values of variables e.g. Set <i>variable_name</i> = 2
If – Else – End If If – Then – Else	Condition structure If <i>condition</i> Then <i>statement 1</i> <i>statement 2</i> <i>statement 3</i> ... End If
For - End For	Repetition controlled repetition structure e.g. For <i>counterVariable</i> = <i>startingValue</i> To <i>MaximumValue</i> <i>statement 1</i> <i>statement 2</i> <i>statement 3</i> ... End For
While – End While	Condition controlled repetition structure e.g. While <i>condition</i> <i>statement 1</i> <i>statement 2</i> <i>statement 3</i> ... End While

Problem 1: Assuming the ocean's level is currently rising at about 1.5 millimeters per year, write a pseudocode to displays:

- The number of millimeters higher than the current level that the ocean's level will be in 5 years.
- The number of millimeters higher than the current level that the ocean's level will be in 7 years.
- The number of millimeters higher than the current level that the ocean's level will be in 10 years.

Problem 2: A soft drink company recently surveyed 16,500 of its customers and found that 15 percent of those surveyed purchase one or more energy drinks per week. Of those customers who purchase energy drinks, approximately 58 percent of them prefer citrus-flavored energy drinks. Write a pseudocode that displays the following:

- The number of customers in the survey who purchase one or more energy drinks per week
- The number of customers in the survey who prefer citrus-flavored energy drinks

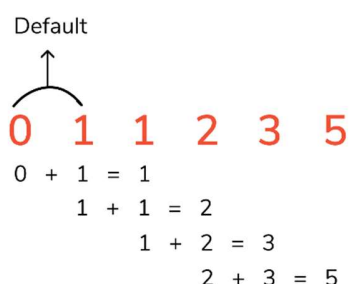
Problem 3: A bookseller has a book club that awards points to its customers based on the number of books purchased each month. The points are awarded as follows:

- If a customer purchases 0 books, he or she earns 0 points.
- If a customer purchases 1 book, he or she earns 5 points.
- If a customer purchases 2 books, he or she earns 15 points.
- If a customer purchases 3 books, he or she earns 30 points.
- If a customer purchases 4 or more books, he or she earns 60 points.

Write a pseudocode program that asks the user to enter the number of books that he or she has purchased this month and then displays the number of points awarded.

Problem 4: Fibonacci Series always starts with 0 and 1, or in other words the first two terms of this series are 0 and 1. Next term in this series is found by adding two previous numbers. Following figure shows first 6 terms of the Fibonacci Series i.e. 0, 1, 1, 2, 3, 5, if we were to print only even numbers then the output will be 0, 2.

Fibonacci Series



Design the algorithm (pseudocode) for a program that prints even terms in Fibonacci series less than N. Where N is the number entered by the user. For example,

If N is 75 then print 0, 2, 8, 34 (i.e. all even terms in Fibonacci series that are less than 20)

If N is 20 then print 0, 2, 8 (i.e. all even terms in Fibonacci series that are less than 20)

If N is 6 then print 0, 2 (i.e. all even terms in Fibonacci series that are less than 6)

Problem 5: Write pseudocode of a program that takes a number that represents **data_Type**, another variable **sign_Unsign** to further classify the data type as signed or unsigned, and a **number** from the user. Verify if that **number** can be stored in that given data type. Range of each datatype is given in the table below.

Input:

1. Take **data_Type** from the user, if the user enters value other than 1 or 2 ask to input **data_Type** again.
2. Take **sign_Unsign** from the user, if the user enters anyother value than 0 or 1 ask to input **sign_Unsign** again
3. Take **number** (any)

Data_Type	Sign_Unsign	Size	Range
1 – short int	0 - signed	2 byte	-32768 to 32767
	1 - unsigned	2 bytes	0 to 65535
2 - int	0 - signed	4 bytes	-2147483648 to 2147483647
	1 - unsigned	4 bytes	0 to 4296967295

Problem 6: Write a program that asks for the number of calories and fat grams in a food. The program should display the percentage of calories that come from fat. If the calories from fat are less than 30% of the total calories of the food, it should also display a message indicating that the food is low in fat.

One gram of fat has 9 calories, so

Calories from fat = fat grams * 9

The percentage of calories from fat can be calculated as Calories from fat x total calories

Problem 7: The distance a vehicle travels can be calculated as follows: distance = speed * time. For example, if a train travels 40 miles per hour for 3 hours, the distance traveled is 120 miles. Write a pseudocode program that asks the user for the speed of a vehicle (in miles per hour) and how many hours it has traveled. The program should then use a loop to display the distance the vehicle has traveled for each hour of that time period. Here is an example of the output:

What is the speed of the vehicle in mph? 40

How many hours has it traveled? 3

Hour Distance Traveled

40

80

120

Problem 8: Write pseudocode of a program which accepts amount in rupees as input (integer) and display total number of Currency Notes/coins of Rs. 5000, 1000, 500, 100, 50, 20, 10, 5, 2 and 1. **For example:** when user enter a number, 575 the results would be like this.

Currency Note: Number

```
500:      1
100:      0
50:       1
20:       1
10:       0
5:        1
1:        0
```

PART II – C++ Output manipulation

Problem 9: Write cout statements with stream manipulators that perform the following:

- Display the number 34.789 in a field of nine spaces with two decimal places of precision.
- Display the number 7.0 in a field of five spaces with three decimal places of precision. The decimal point and any trailing zeroes should be displayed.
- Display the number 5.789e+12 in fixed point notation.
- Display the number 67 left justified in a field of seven spaces.

Problem 10: Write a C++ program to print the following output using input output manipulators.

```
Enter the sales for day 1: 321.57 [Enter]
Enter the sales for day 2: 269.62 [Enter]
Enter the sales for day 3: 307.77 [Enter]

Sales Figures
-----
Day 1: 321.57
Day 2: 269.62
Day 3: 307.77
Total: 898.96
```

Problem 11: Write a program to output in the given format. You need to take 3 numbers as an input in 3 different variables from user. Using the values of these variables, your program should output.

Variables	Numbers	Square	Cube	Half
Var_1	2	4	8	1
Var_2	9	81	729	4
Var_3	3	9	27	1

Table above is the output when user entered 2, 9, 3 as values of variables Var_1, Var_2, and Var_3 respectively. *You cannot use string literals containing white spaces in cout and can use any number as input*

Problem 12: Write a program to output the given patterns using I/O manipulator <iomanip> appropriately. You will input a character from the user and will draw the following pattern of character using that variable.

Note: You cannot use any string literals containing white spaces in cout and can use any character as input to draw the pattern instead of *

```
*****
*       *
*       *
  **
*       *
*       *
*****
```

```
*****
**           **
***         ***
****       ****
*****     *****
*****   *****
***** *****
***** *****
```

```
      *
     **
    ***
   ****
  *****
 *****
*****
 *****
 *****
  **
   *
```