NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES ISLAMABAD CAMPUS

Programming Fundamentals (CS1002)| FALL2022

Due Date: 3rd October, 2022 on GCR

Assignment 2 – Operators and Expressions

[100 marks]

Instructions

Submission: For **each question**, make a **separate file**. i.e., Q1.cpp, Q2.cpp, …., Q10.cpp. Combine all your work (all files) in one .zip file. Use proper naming convention for your submission file. Name the .zip file as SECTION_REG# _02.zip (For example, A_22i0412_02.zip). Submit .zip file on Google Classroom within the deadline. **Failure to submit according to the above format would result in deduction of 10% marks.**

Plagiarism: Plagiarism cases will be dealt 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! Try to learn by doing assignments yourself.

Deadline: The deadline to submit the assignment is **3rd October 2022 at 11:59 PM.** Late submission with marks deduction will be accepted according to the following criteria

Time	Deduction
Submission within next 24 hours	50%
Submission after 24hrs but within 48 hours	75%
Submissions received after 48 hours	100%

Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

Comments: Comment your code properly. Write your name and roll number (as a block comment) at the beginning of the solution to each problem.

Tip: For timely completion of the assignment, start as early as possible.

Note: *Follow the given instructions to the letter, failing to do so will result in a zero*

YOU ARE REQUIRED TO WRITE C++ PROGRAM FOR EACH OF THE FOLLOWING QUESTIONS

Questions

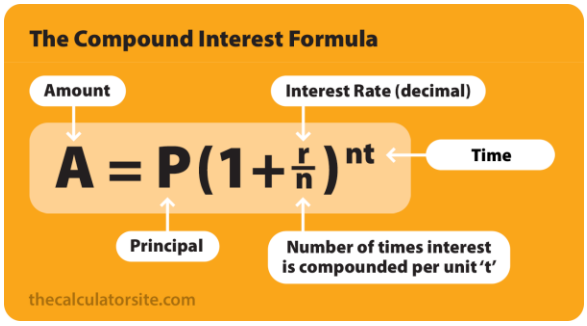
1. Write a program that asks the User to enter 10 numbers (in sorted order) and then compute the mean and median of these numbers and show the result of both.

   The formula for both is as follows :

   Median = $[(n/2)^{th}$ term + $\{(n/2)+1\}^{th}]/2$

   Mean = Σ fx/N

2. Write a program that asks the User to enter the principal amount (P) they want to be deposited in an account, an annual interest rate (r) in percentage, and investment tenure (t) in the year, and then calculate an interest value compounded monthly. The formula for calculating compounded interest (A) is as follows:



   Where P is the principal amount, r is the interest rate, n is the number of times interest is compounded per time period, which is 12 for calculating monthly compounded interest, and t is the number of years.

3. Write a program to solve the following formula:

$$\frac{y - c}{d + v}$$

   where y=10, d=20, enter the c and v values during the program execution and show the result.

4. Write a program that takes an input of the number of hours of the salesman and the rate per hour and calculates his gross pay, and the pay is calculated as follows:

   gross_pay = rate * 40 + 1.5 * rate * (hours - 40)

5. Write a program that takes input from the user how old they are in terms of age in years, months, and days. Based on the fixed set date, such as 1 October 2022, your program shall generate their date of birth.

   Example 1: A is 32 years and 12 days old on 12 January 2021. The system will show that A's date of birth is 01-01-1989.

   Example 2: B is 27 years, 2 months, and 1 day old on 8 January 2021. The system will show that B 's date of birth is 07-11-1994.

6. Write a program that implements the 2nd equation of motion.

$$s = ut + \frac{1}{2}at^2$$

Where
* **s** is the distance travelled time **t**
* **u** is the initial velocity
* **t** is the time
* **a** is the acceleration of the body in motion

   To compute the distance S. All other parameters are inputs from the User.

7. Write a program that prints a box, an oval, an arrow, and a diamond as follows:

8. Write a program that asks the user to type 2 integers A and B and exchange the value of A and B without declaring the third variable.

9. Write a program that takes as input any number of seconds (as int) and then converts it into hours, minutes, and seconds. For example, if you enter 7802, the program should print:

   2 hrs 10 mins 2 secs

   (Hint: Use integer division and modulus operators)

10. The power series representation of sin(x) and cos(x) is

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \ldots$$

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} \ldots$$

You are required to implement a program that takes as input the value of x (in degrees, which should be converted to radians first) and then calculates sin(x) and cos(x). You can assume the formula is fixed for four terms.

Hint: You can use <cmath> library for calculating factorial and power. The formula for conversion from degrees to radians is given below:

X= (Angle in Degrees) * π /180

Note *that π (pi) is a constant value and should be taken as:*
3.14159265358979323846264338327 95