Programming Assignment #2
Calculator for Computer Engineers

Overview

Computer engineers typically use scientific calculators for a variety of tasks, including mathematical calculations, binary and hexadecimal conversions, and programming-related operations. The specific function keys that are most commonly used by computer engineers can vary depending on their specific tasks, but some of the frequently used function keys on a scientific calculator for computer engineering tasks include:

- Basic Arithmetic Functions:
  - Addition (+)
  - Subtraction (-)
  - Multiplication (*)
  - Division (/)
- Exponentiation (^) or Power (^):
  - Used for performing calculations involving exponentiation, such as 2^3 for 2 raised to the power of 3.
- Square Root (√): Useful for finding square roots of numbers.
- Cube Root ($\sqrt[3]{}$): Useful for finding square roots of numbers.
- Logarithm (log):
  - Helps in logarithmic calculations, especially for base-10 logarithms (log10).
- Natural Logarithm (ln):
  - Useful for natural logarithmic calculations (base e).
- Trigonometric Functions:
  - Sine (sin)
  - Cosine (cos)
  - Tangent (tan)

    - Inverse Trigonometric Functions (sin^(-1), cos^(-1), tan^(-1)): Useful for solving trigonometric equations.
    - Degree/Radian Conversion (DRG):
- Functions to convert between decimal, binary, octal, and hexadecimal number systems. This is particularly important for computer engineers who work with low-level programming and digital systems.
- Factorial (!):
    - Calculates the factorial of a number, which can be useful in certain mathematical problems.

These are some of the common function keys you'll find on a scientific calculator that computer engineers may use regularly. The specific needs of an individual computer engineer may vary, so they may use additional functions or specialized calculators tailored to their work, such as graphing calculators or calculators with programming capabilities.

Objective

Develop a C++ program to simulate a scientific calculator with key functions used by computer engineers.

Implementation

Step 1. Use this comment header template

```
// File Name :
// Author :
// Email Address :
// ProgAss Number : 2
// Description :
// Last Changed :
```

Step 2. Write a C++ program which displays a menu and sub-menu of functions which includes:

- Basic Arithmetic (Addition, Subtraction, Multiplication, Division)
- Exponentiation (Power, Square Root, Cube Root)

- Logarithm (Base 10, Natural, Any Base)
- Trigonometry (Sine, Cosine, Tangent) with Inverse
- Number System Conversion (Decimal, Binary, Octal, Hexadecimal)
- Others (Factorial, Fibonacci, Primality Test, Set Numeric Scale)

You may refer to a sample dialogue on the following page or you can download a video demonstrating a sample run of the program.

```
Welcome to Calculator for Engineers
========MENU========
(1) Basic Arithmetic
(2) Powers
(3) Logarithm
(4) Trigonometry (with DRG)
(5) Number System Conversion
(6) Others
Press 0 to EXIT

Others
========MENU========
(1) Factorial
(2) Fibonacci
(3) Primality Test
(4) Set Numeric Scale

Set Numeric Scale
Enter maximum decimal places: 4

Welcome to Calculator for Engineers
========MENU========
(1) Basic Arithmetic
(2) Powers
(3) Logarithm
(4) Trigonometry (with DRG)
(5) Number System Conversion
(6) Others
Press 0 to EXIT

Basic Arithmetic
========MENU========
(1) Addition
(2) Subtraction
(3) Multiplication
(4) Division

Division
===============
Enter the dividend: 9
Enter the divisor: 2

Quotient: 4.5000
```

Deliverables

Submit your C++ program (.cpp) using the upload facility found in our Google Classroom page. Use your family name as the filename of the source code, for example:

<Family Name>_PA2.cpp

Lannister_PA2.cpp

Grading Rubric

100-96	**95-86**	**85-70**
- submitted on-time - program compiles and runs without error - code correctly followed the comment header - code has appropriate and descriptive comments - program accepts correct inputs and produces correct outputs - program output format is the same as that of the sample dialogues given the same inputs - program accepts incorrect inputs, performs basic error handling, and produces correct outputs.	- submitted on-time - program compiles and runs without error - correctly followed the comment header - code has appropriate and descriptive comments - program accepts correct inputs and produces correct outputs - program output format is the same as that of the sample dialogues given the same inputs	- submitted on-time - program compiles and runs without error - correctly followed the comment header - code has appropriate and descriptive comments - program accepts correct inputs and produces correct outputs
69-60	**59-50**	**0**
- program compiles and runs without error - program accepts correct inputs and produces correct outputs	- code fails to solve the given task	- did not submit within a week after the deadline

References

https://en.wikipedia.org/wiki/Scientific_calculator

https://www.khanacademy.org/math/arithmetic

https://en.wikipedia.org/wiki/Trigonometry

https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:logs/x2ec2f6f830c9fb89:log-intro/a/intro-to-logarithms