Task(12.2)

Multi-Purpose Calculator System

Requirements:

1. Abstract Base Class: Calculator
   - This is an abstract class that serves as a blueprint for all calculator types. It declares the following pure virtual functions:
     - void add() – A function to add two numbers.
     - void sub() – A function to subtract two numbers.
     - void Display() – A function to display the type of calculator in use.
   - This class cannot be instantiated directly, and all derived classes must implement these methods.
2. Derived Class: CalculatorBase
   - This class provides basic calculator functionality for addition and subtraction.
   - Methods:
     - add(): Prompts the user to input two numbers and displays their sum.
     - sub(): Prompts the user to input two numbers and displays their difference.
     - Display(): Outputs "Basic Calculator operation" to indicate this calculator's purpose.
3. Derived Class: ProgrammerCalculator
   - This class extends CalculatorBase and adds functionality specific to programmer calculations, including conversions between hexadecimal and decimal.
   - Methods:
     - hexaToDecimal(): Converts a hexadecimal number (input as a string) to its decimal equivalent.
     - decimalToHexa(): Converts a decimal number to its hexadecimal equivalent.
     - Display(): Outputs "Programming Calculator operation" to indicate this calculator's purpose.
4. Derived Class: ScientificCalculator
   - This class extends CalculatorBase and adds functionality for scientific calculations, particularly trigonometric functions like sine and cosine.
   - Methods:
     - sin_ang(): Prompts the user to input an angle in degrees and calculates its sine.
     - cos_ang(): Prompts the user to input an angle in degrees and calculates its cosine.
     - Display(): Outputs "Scientific Calculator operation" to indicate this calculator's purpose.

Program Structure:
In the main() function:

- The user is prompted to choose between the following calculators:
  - Basic Calculator (C)
  - Scientific Calculator (S)
  - Programmer Calculator (P)
  - Exit (E)
- Based on the user's choice, the appropriate calculator is instantiated using a base class pointer (CalculatorBase *Cal).
- The program then allows the user to choose between various operations based on the type of calculator:
  - Basic Calculator:
    - S: Subtract two numbers.
    - A: Add two numbers.
  - Scientific Calculator:
    - S: Calculate the sine of an angle.
    - C: Calculate the cosine of an angle.
  - Programmer Calculator:
    - H: Convert hexadecimal to decimal.
    - D: Convert decimal to hexadecimal.
- If an invalid choice is made, the user is given 3 attempts before the program exits.

Thank You