Problem Set 5

1. Create a class `Shape` with a function `area(int side)` that calculates the area of a square. Derive a class `Rectangle` from `Shape` and overload the function by defining `area(int length, int width)` to calculate the area of a rectangle. Write a main program to call both functions using a `Rectangle` object.

2. Define a base class `Printer` with two overloaded functions: `void print(int x); void print(double y);` Define a derived class `AdvancedPrinter` with a new function: `void print(string s);`
    a. Create an object of `AdvancedPrinter` and try to call all three versions of `print()`.
    b. Identify the problem that occurs (name hiding) and solve it using **scope resolution** or the `using` keyword.

3. Create a class `Box` with overloaded constructors:
    a. Default constructor that sets length, width, height to `1`.
    b. A constructor that takes one parameter and sets all dimensions to that value (cube).
    c. A constructor that takes three parameters for length, width, and height.

    Now write a program to create objects using all three constructors and display their volumes.

4. Create a class `Complex` with attributes `real` and `imag`.
    a. Overload the `*` operator to multiply two complex numbers.

    Now write a program to input two complex numbers, multiply them, and display the result.

5. Create a class `BankAccount` with attribute `balance`.
    a. Overload **prefix `--`** to deduct $1 from balance.
    b. Overload **postfix `--`** to deduct $1 but return balance before deduction.

    Now take input balance from the user and show how prefix and postfix operations differ.

6. Create a class `Student` with `marks` as an integer.
    a. Overload **prefix `++`** to add 5 marks.
    b. Overload **postfix `++`** to add 5 marks but return the original marks before increment.

    Now display marks before and after using both prefix and postfix operators.