Week 4- Assignment (2 marks)

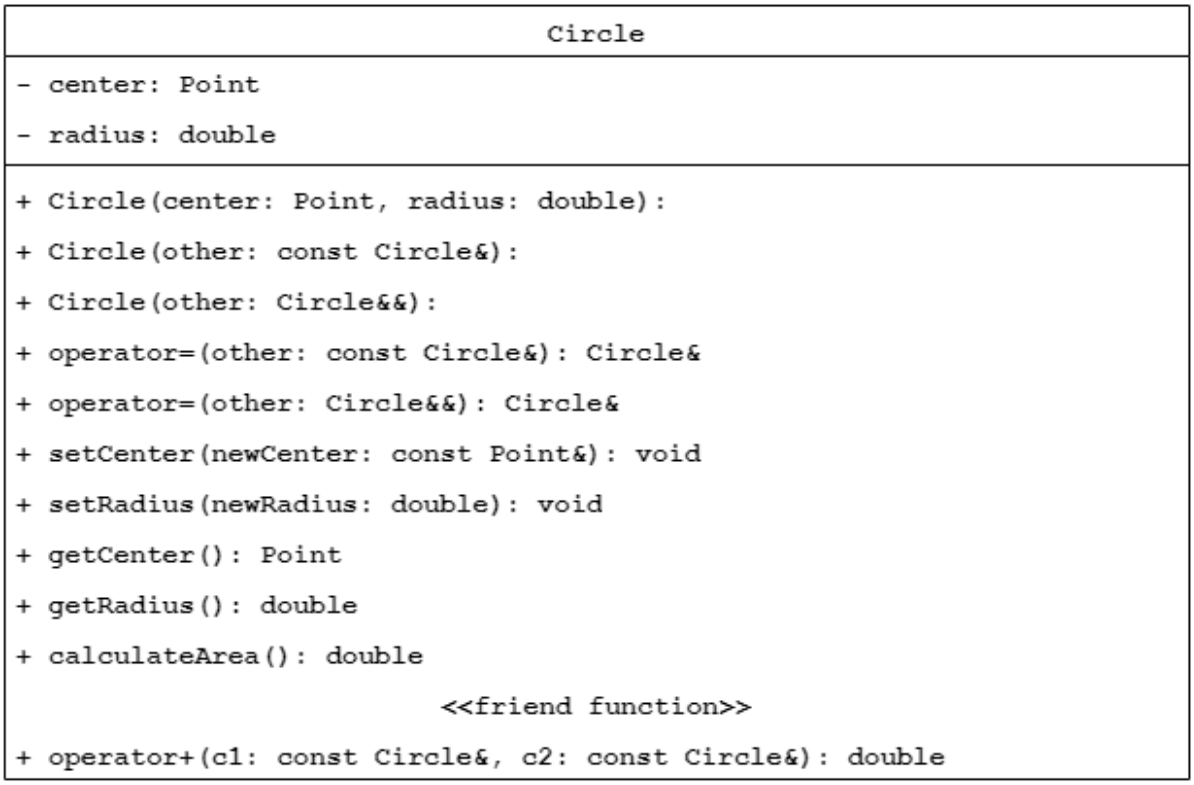
Note: All programs must use the appropriate C++ features.

Objective: To understand and implement advanced C++ class features such as constructors, assignment operators, move semantics, friend functions, and class aggregation. The assignment will demonstrate the relationship between two classes (Circle and Point) and provide hands-on experience with object-oriented programming concepts in C++.

Description:

In this assignment, you will implement two C++ classes, **Circle** and **Point**, as defined by their UML diagrams. The **Point** class will represent a point in 2D space with x and y coordinates. The **Circle** class will represent a circle defined by a **Point** object representing its center and a **double** for its radius. The friend function operator+ in **Circle** adds the areas of two circles and returns the total area.

Point
- x: double* - y: double*
+ Point(x: double=0, y:double=0): + ~Point(): + Point(other: const Point&): + Point(other: Point&&): + operator=(other: const Point&): Point& + operator=(other: Point&&): Point& + setX(x: double): void + setY(y: double): void + getX( ): double + getY( ): double



Tasks:

Task1: Implement the Point class, as defined by its UML diagrams.

- In the Copy constructor, it should contain a line like:
  `cout<<"Point: Copy constructor\n";`
- In the Move constructor, it should contain a line like:
  `cout<<"Point: Move constructor\n";`
- In the Copy assignment, it should contain a line like:
  `cout<<"Point: Copy assignment\n";`
- In the Move assignment, it should contain a line like:
  `cout<<"Point: Move assignment\n";`

Task2: Implement the Circle class, as defined by its UML diagrams.

- In the Copy constructor, it should contain a line like:
  `cout<<"Circle: Copy constructor\n";`
- In the Move constructor, it should contain a line like:
  `cout<<"Circle: Move constructor\n";`
- In the Copy assignment, it should contain a line like:
  `cout<<"Circle: Copy assignment\n";`
- In the Move assignment, it should contain a line like:
  `cout<<"Circle: Move assignment\n";`

The input and output should be like below:

Input:

Must use the given week4.cpp to test your implementation; don't change anything in the main function.

Output:

```
output 1:
Point: Copy constructor
Point: Copy constructor

output 2:
Point: Copy constructor
Circle: Copy constructor

output 3:
Point: Move constructor
Circle: Move constructor

output 4:
Point: Copy constructor
Point: Copy constructor

output 5:
Circle: Copy assignment
Point: Copy assignment

output 6:
Circle: Move assignment
Point: Move assignment

output 7:
Total area of c2 and c4: 157.08
```

Submit:

1, **all C++ source code**: *.cpp and *.hpp if your code is organized into separate files.

Organizing the source code into separate files is not mandatory.

You can consolidate all code into a single cpp file.

2, **week4.txt**: a txt file contains all the source code.

3, **output.jpg**, or output.png, or output.bmp: a screenshot of the output by your program

Please refer to the submission page for the Marking Rubric.