09 - Programming Exercises
Circle ADT

Program the following task in your C++ compiler. Keep compiling and executing even after writing a single line of code.

ADT: Circle

Write a **Circle** class with the following functionalities.

1. The class should have the following four private data members.

1) An integer **x** represents the x-axis of the circle.
2) An integer **y** represents the x-axis of the circle.
3) A float **radius** represents the radius of the circle.
4) A constant double **PI** initialized to the value of pi (3.141593).

The values assigned to **x** and **y** should fall within the range $[-50, 50]$. If the assigned value is outside this range, it should default to 0. The radius should be within the range $[1, 10]$, defaulting to 5 if outside this range.

2. Implement accessors and mutators for all data members of the class.

3. Provide the following constructors and a destructor:

- A constructor that accepts the circle's **x**, **y** coordinates, and **radius** as arguments and assigns them to the appropriate member variables.
- A constructor that accepts the circle's **x** and **y** coordinates as arguments and assigns them to the appropriate member variables, with the **radius** field assigned the default value.
- A constructor that accepts the circle's **x** coordinate and radius as arguments and assigns them to the appropriate member variables, with the **y** coordinate assigned the default value.
- A default constructor that initializes all data members of the class with default values.
- A copy constructor initializes a circle's object with an existing object.
- A destructor that displays a message "Destructor executed..." upon execution.

4. Implement the following member functions:

- **setCircle** method, which accepts the circle's **x**, **y** coordinates, and **radius** as arguments and assigns them to the appropriate member variables.
- **getCircle** method to initialize the data of a circle taken from the user through the console.
- **putCircle** method to display the information of a particular circle on the console.
- **getArea** method to calculate and return the area of a circle $PI \times radius^2$.
- **getDiameter** method to calculate and return the diameter of a circle $radius \times 2$.
- **getCircumference** method to calculate and return the circumference of a circle $2 \times PI \times radius$.
- **addCircle** method, which accepts two circle objects and returns their sum.
- **isEqual** method, which accepts two circle objects and returns *true* if they have the same state, otherwise *false*.
- **findCircle** method, which accepts an array of circle objects and returns the index of the array that is equal to the left-hand side object, or -1 otherwise.
- **updateObjects** method, which accepts an array of circle objects and updates the **radius** of all those objects to the **radius** of the left-hand side object existing in the array with the same **x** and **y** coordinates.

5. Test the functionality of Cuboids class by creating a few objects of it in the **main** function.