Python Circe's Circle Calculator OOP

Time required: 120 minutes

- Comment each line of code as shown in the tutorials and other code examples.
- Follow all directions carefully and accurately.
- Think of the directions as minimum requirements.

Pseudocode

1. Write pseudocode for the exercise
2. Save it in a document
3. Submit with the assignment

Requirements

In the realm of Greek mythology, Circe, an enchantress and minor goddess of magic, was captivated by circles and their eternal symbolism. Amid her divine duties, she crafted a mesmerizing circle calculator, a conduit for unveiling the mysteries of circumference, diameter, and area. With each gentle touch, the calculator harmonized mathematical truths and magical wonders, leaving an indelible mark as a symbol of Circe's devotion to both mysticism and the elegance of mathematics.

Circe is very pleased with many of the programs you have created for her. She is curious if you understand OOP. If you can successfully complete this assignment, you will be promoted to Programmer, 1st class in Circe's Circle Club.

NOTE: Circe likes all math calculations. You can do a different math calculation with this program if you wish.

Ask the user to enter the radius of a circle. Calculate and display the circle's diameter, area, and circumference.

1. Create a **CircleCalculator()** class in a Python file named **circle.py** A separate file is the preferred way to create a class.
   NOTE: A class stores data and calculates with methods. There aren't any print statements.
2. Store all object data as private attributes.

3. Create the following methods.

set_radius() – Set the radius attribute based on input from the user

calculate_diameter() - Calculate diameter.
formula: $\boldsymbol{D = 2r}$ where r = radius

calculate_area() - Calculate area.
formula: $\boldsymbol{A = \pi r^2}$ where r = radius

calculate_circumference() - Calculate circumference.
formula: $\boldsymbol{C = 2\pi r}$ where r = radius

__repr__() or __str__ - Return a concatenated string of the user input and the results.

4. Create a Python program named **circle_app.py**
5. Create a main function to run the program.
    a. Create a print_title() function.
6. Create a program object.
7. Call each method from the program object.

__str__ Method

In Python, the **__str__** method is a special dunder (double underscore) method used to define a string representation of an object. Its primary goal is to provide a clear and unambiguous representation of the object.

Example program:

```
class Car:
    def __init__(self, make, model, year):
        self.make = make
        self.model = model
        self.year = year

    def __str__(self):
        return f"Car: {self.make}, {self.model}, {self.year}"

my_car = Car("Toyota", "Corolla", 2020)
print(my_car)
```

Example run:

```
Car: Toyota, Corolla, 2020
```

TODO Outline of Program

You can use the following TODO outline to get started with your program.

circle.py

```
"""
    Name: circle.py
    Author:
    Created:
    Purpose: Python class to calculate
    the diameter, area, and circumference of a circle
"""
# Import math module to get the value of pi
import math

# TODO: Define CircleCalculator class

# TODO: Define set_radius() with incoming parameter from user

# TODO: Method to calculate diameter of circle
# formula: d = 2r, where r = radius

# TODO: Method to calculate area of circle
# formula: a = πr², where r = radius
# math.pi

# TODO: Method to calculate circumference of circle
# formula: c = 2πr, where r = radius
# math.pi

# TODO: __str__ method to concatenate results as a string and return to
# main to be displayed
# Concatenate a string to display the results
# Use f-strings to format float to 2 decimal places
# use comma (,) as a 1,000's separator
```

F-strings formatting example:

```
print(f" Perimeter: {perimeter:,.2f}")
```

```
: indicates formatting codes are coming up
, comma formats 1,000 separators
.2f formats a float to 2 decimal places
```

circle_calculator_app.py

```
# TODO: Function to print creative program title

# TODO: Start program with main():
# TODO: Call function to print program title
# TODO: Get user input as float for radius

# TODO: Create program object to start program

# TODO: Use program object to access object methods
```

Example run:

```
------------------------------------------------------------------
|            Circe's Circle Calculator in Python                 |
| Calculate the diameter, area, and circumference of a Circle    |
------------------------------------------------------------------
Enter radius: 2563.36
Radius entered: 2563.36
      Diameter: 5,126.72
          Area: 20,642,822.53
 Circumference: 16,106.07
```

```
------------------------------------------------------------------
|            Circe's Circle Calculator in Python                 |
| Calculate the diameter, area and circumference of a Circle     |
------------------------------------------------------------------
Enter radius: 100.2
You entered:   radius 100.2
Diameter:      200.40
Area:          31,541.72
Circumference: 629.58
```

Challenges

- Make a Tkinter GUI program importing the circle.py file.

Assignment Submission

1. Use pseudocode or TODO.

2. Comment your code to show evidence of understanding.
3. Attach the program files.
4. Attach screenshots showing the successful operation of the program.
5. Submit in Blackboard