C++ Circe's Circle Calculator Functions

Time required: 90 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. Submit with the assignment

Requirements

Circe is an enchantress and a minor goddess of magic in ancient Greek mythology and religion. She loves circles! She would like you to create a circle calculator in Java for her to use whenever she takes a break from being a goddess.

This program will ask the user to enter the radius of a circle. Calculate and display the circle's diameter, area, and circumference.

1. Create a C++ program named **circle_calculator_functions.cpp**
2. Allow user to choose to quit or run the program again.
3. Create the following functions.

programTitle() – Print a creative program title.

getRadius() - Get circle's radius from user. Return value as double.

getDiameter() - Accept radius as argument. Calculate diameter. Return value as double.
formula: $\boldsymbol{D = 2r}$ where r = radius

getArea() - Accept radius as argument. Calculate area. Return value as double.
formula: $\boldsymbol{A = \pi r^2}$ where **r = radius**

getCircumference() - Accept radius as argument. Calculate circumference. Return value as double.
formula: $\boldsymbol{C = 2\pi r}$, where r = radius

displayResults() - Accept radius, diameter, area, and circumference as arguments. Display results on the screen.

Convert Math Formula to C++ Code

The following is an example of how to convert math formulas to C++ code.

```
// C++ does not have a built-in constant for PI
// Declare PI as a constant
const double PI = 3.14159265358979323846;

# Diameter of a circle: d = 2r
diameter = 2.0 * radius;

# Area of a circle: a = πr2
area = PI * (radius * radius);

# Circumference of a circle: c = 2πr
circumference = (2.0 * PI) * radius;
```

TODO Outline of Program

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

```
/**
 * Filename: CircleCalculator.cpp
 * Written by:
 * Written on:
 * Purpose: C++ program to calculate
 * the diameter, area, and circumference of a circle
 */
// TODO: Create function headers
// TODO: Create variables
// Call all functions from main

// TODO: programTitle() Print creative program title

// TODO: getRadius() Get user input for radius as float

// TODO: getDiameter() Calculate diameter of circle
// formula: d = 2r, where r = radius

// TODO: getArea() Calculate area of circle
// formula: a = πr2, where r = radius

// TODO: Calculate circumference of circle
// TODO: getCircumference() formula: c = 2πr, where r = radius

// TODO: displayResults()
// Echo user input
// Use printf to format numbers %.2f\n
```

Example run:

```
------------------------------------------------
|       Circe's Circle Calculator in C++       |
| Calculate the area and circumference of a Circle |
------------------------------------------------
Enter radius: 114.25
Diameter:      228.50
Area:          41,007.41
Circumference: 717.85
```

Assignment Submission

1. Attach the pseudocode.

2. Attach the program files.
3. Attach screenshots showing the successful operation of the program.
4. Submit in Blackboard.