CST 3503
Instructor: Adnan A. Khan
Fall 2021

Assignment 3

Assignment Due Date: Wednesday December 1, 11:59 pm

1. Define an abstract base class called **BasicShape**. The BasicShape class should have the following members: *(Reference: Fig 12.9 and 12.10)*

    a) Protected Member Variable: *area* (a double used to hold the shape's area).

    b) Private Member Variable: *name* (a string to indicate the shape's type)

    c) Constructor and Public Member Functions:
    - *BasicShape(double a, string n):* A constructor that sets value of member *area* with *a* and member *name* with *n*.
    - *calcArea()*: This public function should be a pure virtual function.
    - *print()*: A public virtual function that only prints the value of data member *area*
    - *getName():*A public function that returns the value of data member *name*

2. Define a class named **Circle**. It should be derived from the BasicShape class. It should have the following members: *(Reference: Fig 12.11 and 12.12)*

    a) Private Member Variable: *radius* (a double used to hold the circle's radius)

    b) Constructor and Public Member Functions:
    - *Circle(double a, string n, double r)*: constructor that should call the base class constructor to initialize the member *area* with *a* and *name* with *n*. The constructor will also set the value of member *radius* with *r*
    - *calcArea():* Overridden function that calculates the area of the circle (area = 3.14159 * radius * radius) and stores the result in the inherited member *area*.
    - *print()*: Overridden function that will print the *radius*, inherited member *area* and inherited member *name*. This function should use the base class's print function to print the *area.*

3. After you have created these classes, create a test program *(Reference: Fig 12.17)*
    - Write a function named *poly* whose only parameter is a BasicShape pointer.
    - Function *poly* should use the BasicShape pointer to invoke *calcArea* function and *print* function.
    - In *main()*: define a Circle object with initial area *0*, name *Round* and radius *10*.
    - From *main(),* call the function *poly* such that it will polymorphically (i.e. using a pointer of the base class) invoke *calcArea* function and *print* function of the Circle object.

Submission:

Submit the assignment via Blackboard. From the CST3503 Course in Blackboard, Click *Assignments and Classwork* tab on the left panel to access the Assignment. Click on Assignment3, then scroll down. Click on the browse button to attach the zipped (.zip) file.

- Name of the zipped file will be your lastname_assign3 (e.g., khan_assign3)
- Make sure zipped file contains all .cpp and .h files.
- Do **not** submit only **.sln** file as it cannot be opened from another computer

Late Penalty:

- 10% off each week from due date.