Week 5 Homework Q21

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CE480 - Java and Internet Application

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Author Note

The Question

1.
   i. class Square
      - Referenes
        - Class with numberical attribute
      - Package
        -
        - `package shape;`

      - Attributes
        - int s ; // side
      - Member functions
        - Helping function
          - int square(int i);

            Return the square of i

        - Manager functions
          - Constructor
        - Implementor
          - void enLarge(int ds);

            s is increased by ds

          - int area();
          - `Call the method square() to compute area of a square`

          - int circumference();

            Return the cicumference of a square

        - Access functions
          - 1 get functions
          - 1 set functions
          - Predicate
            - isLarge();

              A square is large if side is greater than 10

ii. class Circle

- Referenes
  - Class with numberical attribute
- Package
  -
  - `package shape;`

- Attributes
  - double r; // radius
- Member functions
  - Helping function
    - double pi();

      Return the value 3.1416
  - Manager functions
    - Constructor
  - Implementor
    1. void enLarge(double dr);

       r is increased by dr

    2. double area();

       Call the method pi() to compute area of a circle

    3. double circumference();

       Call the method pi() to compute the cicumference of a circle
  - Access functions
    1. 1 get function
    2. 1 set function
    3. Predicate
       - isLarge();

         A circle is large if its radius is greater than 10

       - isAPoint();

         A circle is a point if r == 1;

iii. class Coin

- References
  - Class containg one layer of simple object attribute
- Package
  -
  - `package money;`
  - `// Since this class uses the Cirle and the Square classes,`
  - `// their package needs to be imported.`
  - `import shape.*;`

- Attributes
  - Cicle circleObj;
  - Square squareObj;
- Member functions
  - Helping function
    1. getCircleArea();

       Return the area of the coin's circle portion

    2. getSquareArea();

       Return the area of the coin's square portion

  - Manager functions
    1. Two Constructors
    2. `public Coin(int s1, double r1);`
    3. `public Coin(Square squareObj1, Circle circleObj1);`

  - Implementor
    1. area(): Use the helping functions to compute the area of a coin which is equal to the substraction of the square's area from its circle's area.
  - Access functions
    1. 2 get functions
    2. 2 set functions
    3. Predicate
       - isNormal();
         - `A coin is normal if its diameter is longer`
         - `than the diagnal of the square.`

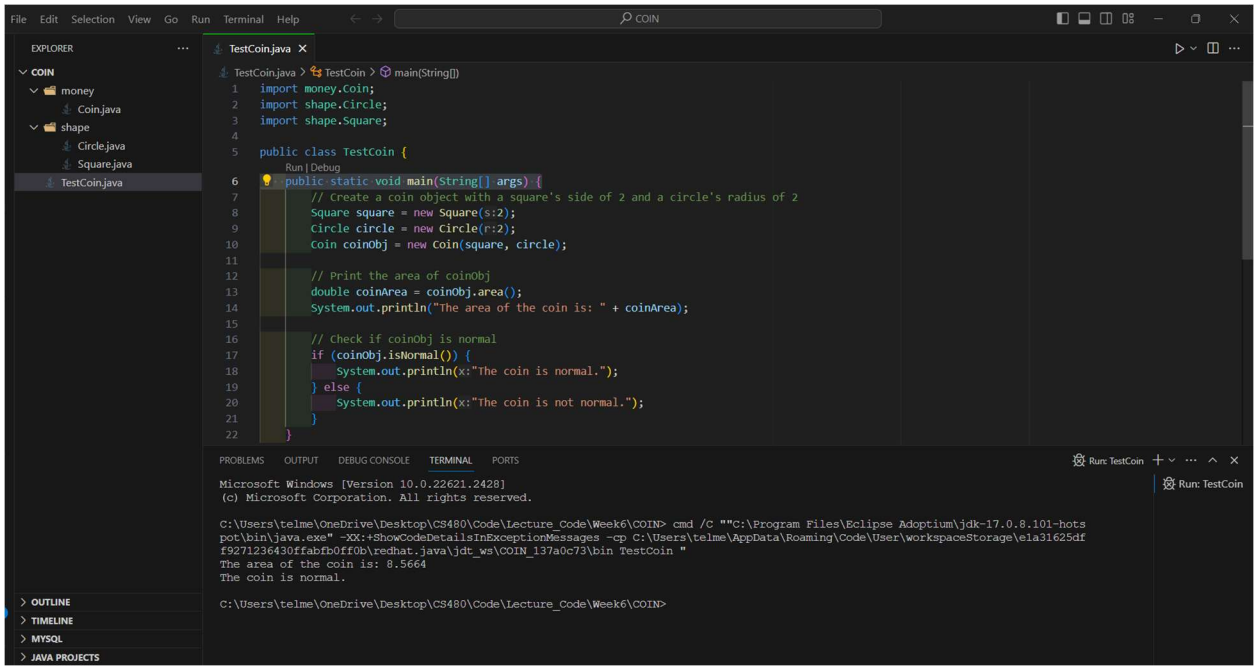
iv. Test your class by creating the file TestCoin.java.

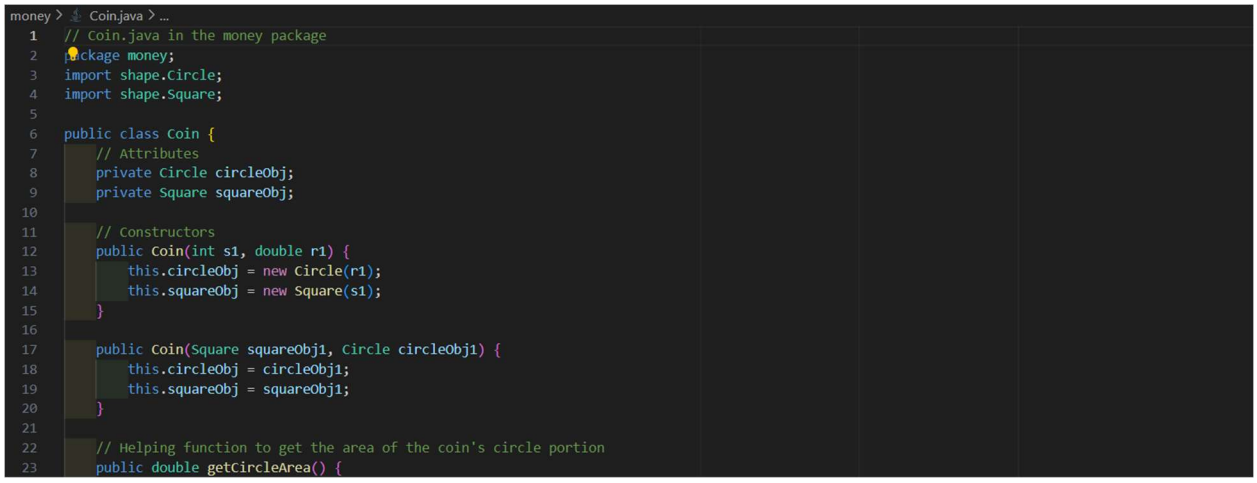
1. Import the packages

```
2.
3. import money.*;
4. import shape.*;
```

5. Create 1 object
   - coinObj whose square's side is 2 and its circle's radius is 2
6. Print the area of coinObj
7. Check if coinObj is normal

==========ScreenShot==========





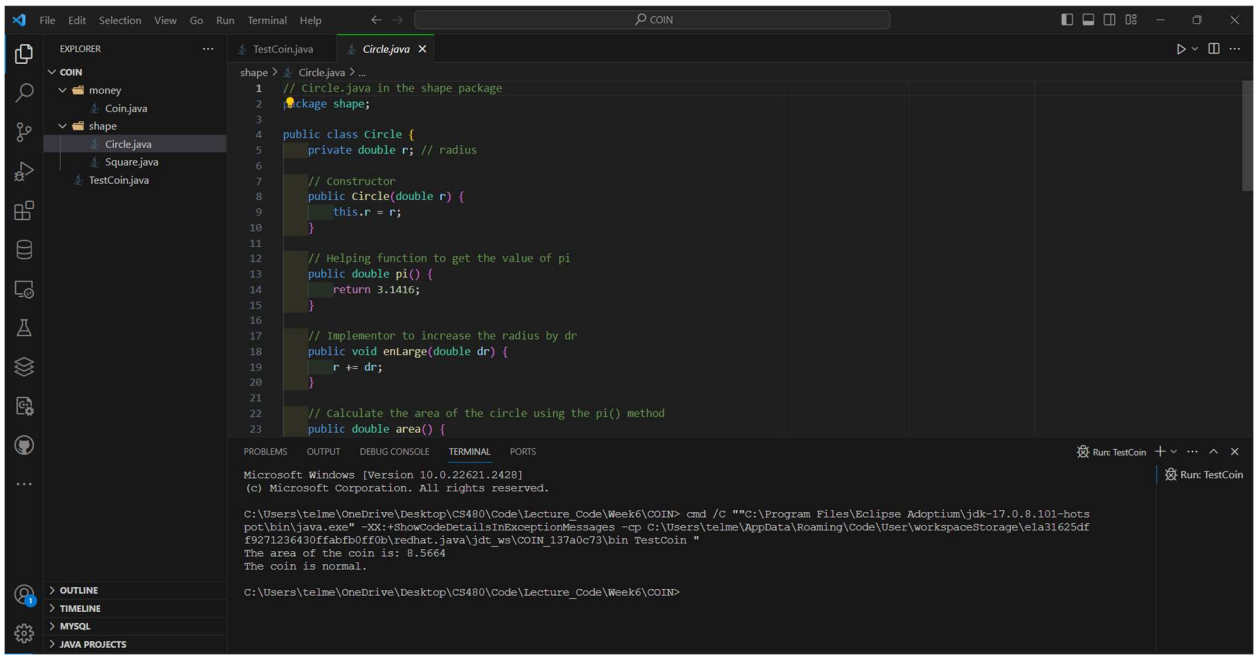
```java
// Coin.java in the money package
package money;
import shape.Circle;
import shape.Square;

public class Coin {
    // Attributes
    private Circle circleObj;
    private Square squareObj;

    // Constructors
    public Coin(int s1, double r1) {
        this.circleObj = new Circle(r1);
        this.squareObj = new Square(s1);
    }

    public Coin(Square squareObj1, Circle circleObj1) {
        this.circleObj = circleObj1;
        this.squareObj = squareObj1;
    }

    // Helping function to get the area of the coin's circle portion
    public double getCircleArea() {
```



```java
// Circle.java in the shape package
package shape;

public class Circle {
    private double r; // radius

    // Constructor
    public Circle(double r) {
        this.r = r;
    }

    // Helping function to get the value of pi
    public double pi() {
        return 3.1416;
    }

    // Implementor to increase the radius by dr
    public void enLarge(double dr) {
        r += dr;
    }

    // Calculate the area of the circle using the pi() method
    public double area() {
```

```
Microsoft Windows [Version 10.0.22621.2428]
(c) Microsoft Corporation. All rights reserved.

C:\Users\telme\OneDrive\Desktop\CS480\Code\Lecture_Code\Week6\COIN> cmd /c ""C:\Program Files\Eclipse Adoptium\jdk-17.0.8.101-hotspot\bin\java.exe" -XX:+ShowCodeDetailsInExceptionMessages -cp C:\Users\telme\AppData\Roaming\Code\User\workspaceStorage\e1a31625df9271236430ffabfb0ff0b\redhat.java\jdt_ws\COIN_137a0c73\bin TestCoin "
The area of the coin is: 8.5664
The coin is normal.

C:\Users\telme\OneDrive\Desktop\CS480\Code\Lecture_Code\Week6\COIN>
```

==========Source Code==========

TestCoin.java

```java
import money.Coin;
import shape.Circle;
import shape.Square;

public class TestCoin {
    public static void main(String[] args) {
```

```
        // Create a coin object with a square's side of 2 and a circle's
radius of 2
        Square square = new Square(2);
        Circle circle = new Circle(2);
        Coin coinObj = new Coin(square, circle);

        // Print the area of coinObj
        double coinArea = coinObj.area();
        System.out.println("The area of the coin is: " + coinArea);

        // Check if coinObj is normal
        if (coinObj.isNormal()) {
            System.out.println("The coin is normal.");
        } else {
            System.out.println("The coin is not normal.");
        }
    }
}
```

Coin.java

```
// Coin.java in the money package
package money;
import shape.Circle;
import shape.Square;

public class Coin {
    // Attributes
    private Circle circleObj;
    private Square squareObj;

    // Constructors
    public Coin(int s1, double r1) {
        this.circleObj = new Circle(r1);
        this.squareObj = new Square(s1);
    }

    public Coin(Square squareObj1, Circle circleObj1) {
        this.circleObj = circleObj1;
        this.squareObj = squareObj1;
    }

    // Helping function to get the area of the coin's circle portion
```

```
    public double getCircleArea() {
        return circleObj.area();
    }

    // Helping function to get the area of the coin's square portion
    public int getSquareArea() {
        return squareObj.area();
    }

    // Implementor to calculate the area of the coin
    public double area() {
        return getCircleArea() - getSquareArea();
    }

    // Access function to get the square object
    public Square getSquareObj() {
        return squareObj;
    }

    // Access function to set the square object
    public void setSquareObj(Square squareObj) {
        this.squareObj = squareObj;
    }

    // Access function to get the circle object
    public Circle getCircleObj() {
        return circleObj;
    }

    // Access function to set the circle object
    public void setCircleObj(Circle circleObj) {
        this.circleObj = circleObj;
    }

    // Predicate function to check if the coin is normal
    public boolean isNormal() {
        double diameter = 2 * circleObj.getRadius();
        double diagonal = Math.sqrt(2) * squareObj.getSide();
        return diameter > diagonal;
    }
}
```

Cirlce.java

```java
// Circle.java in the shape package
package shape;

public class Circle {
    private double r; // radius

    // Constructor
    public Circle(double r) {
        this.r = r;
    }

    // Helping function to get the value of pi
    public double pi() {
        return 3.1416;
    }

    // Implementor to increase the radius by dr
    public void enLarge(double dr) {
        r += dr;
    }

    // Calculate the area of the circle using the pi() method
    public double area() {
        return pi() * r * r;
    }

    // Calculate the circumference of the circle using the pi() method
    public double circumference() {
        return 2 * pi() * r;
    }

    // Get function for radius
    public double getRadius() {
        return r;
    }

    // Set function for radius
    public void setRadius(double r) {
        this.r = r;
    }

    // Predicate to check if the circle is large
    public boolean isLarge() {
        return r > 10;
    }
```

```
    // Predicate to check if the circle is a point
    public boolean isAPoint() {
        return r == 1;
    }
}
```

Square.java

```
// Square.java in the shape package
package shape;

public class Square {
    private int s; // side

    // Constructor
    public Square(int s) {
        this.s = s;
    }

    // Helping function to calculate the square of a number
    public int square(int i) {
        return i * i;
    }

    // Implementor to increase the side by ds
    public void enLarge(int ds) {
        s += ds;
    }

    // Calculate the area of the square using the square() method
    public int area() {
        return square(s);
    }

    // Calculate the circumference of the square
    public int circumference() {
        return 4 * s;
    }

    // Get function for side
    public int getSide() {
        return s;
```

```
    }

    // Set function for side
    public void setSide(int s) {
        this.s = s;
    }

    // Predicate to check if the square is large
    public boolean isLarge() {
        return s > 10;
    }
}
```