Project 1

CMSC 335 6381

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**Assignment Details**

Design, implement and test a Java class Inheritance hierarchy that would satisfy the following is-a and has-a relationships:

•  A Shape is an object

•  A TwoDimensionalShape is a Shape

•  A ThreeDimensionalShape is a Shape

•  A Circle is a TwoDimensionalShape

•  A Square is a TwoDimensionalShape

•  A Triangle is a TwoDimensionalShape

•  A Rectangle is a TwoDimensionalShape

•  A Sphere is a ThreeDimensionalShape

•  A Cube is a ThreeDimensionalShape

•  A Cone is a ThreeDimensionalShape

•  A Cylinder is a ThreeDimensionalShape

•  A Torus is a ThreeDimensionalShape

•  A Shape has a NumberofDimensions

•  A TwoDimensionalShape has an area

•  A ThreeDimensionalShape has a volume

1. Note you should fill in additional methods and variables that make sense for each of the classes. Also some assumptions about shape types is appropriate and should be documented in the code and documents submitted. For example, type of triangle ...

Create a command line driven menu that allows a user to construct each of the TwoDimensional and ThreeDimensional Shape subclasses. The menu should continue to loop prompting for a specific class and then prompt for appropriate input parameters. The values returned should be the volume or area as appropriate to the shape. Error checks should be in developed to make sure appropriate menu items and types of data were input and prompt the user to enter to correct data. An option to exit the program should be available as well that will provide an appropriate Thank you message along with the current date and time.

The following represents a possible menu session for a user: \*\*\*\*\*\*\*\*\*Welcome to the Java OO Shapes Program \*\*\*\*\*\*\*\*\*\*

Select from the menu below:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

Construct a Circle Construct a Rectangle Construct a Square Construct a Triangle Construct a Sphere Construct a Cube Construct a Cone Construct a Cylinder Construct a Torus

Exit the program

2  
You have selected a Rectangle  
What is the length?  
4  
What is the Width?  
9.5  
The area of the Rectangle is 38.  
Would you like to continue? (Y or N)  
3  
Sorry I do not understand. Enter Y or N

Y  
Select from the menu below:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

Construct a Circle Construct a Rectangle Construct a Square Construct a Triangle Construct a Sphere Construct a Cube Construct a Cone Construct a Cylinder Construct a Torus

Exit the program

10  
Thanks for using the program. Today is Nov 11 at 1:40 PM.

**UML Diagram:**

Diagram

Description automatically generated

**Classes:**

* Main
* Shape
* TwoDimensionalShape
* Circle
* Rectangle
* Square
* Triangle
* ThreeDemensionalShape
* Sphere
* Cube
* Cone
* Torus
* Cylinder

**Variables:**

* Class Circle
* Radius
* numberOfDimensions
* Class Rectangle
* Width
* Length
* numberOfDimentions
* Class Square
* Side
* numberOfDimentions
* Class Triangle
* Height
* Base
* numberOfDimentions
* Class Sphere
* Radius
* numberOfDimentions
* Class Cube
* Area
* numberOfDimentions
* Class Cone
* Radius
* Height
* numberOfDimentions
* Class Torus
* majorRadius
* minorRadious
* numberOfDimentions
* Class Cylinder
* Radius
* Height
* numberOfDimentions

**Methods:**

* Main
* circleRadius, rectWidth, rectLeghth, squareSide, triangleHeight, triangleBase, sphereRadius, cubeArea, coneRadius, coneHeight, cylinderHeight, cylinderRadius, minorRadius, majorRadius
* Shape
* numberOfDimentions
* TwoDimensionalShape
* getArea
* Circle
* getArea, getRadius, setRadius
* Rectangle
* getArea, getWidth, getLength, setWidth, setLength
* Square
* getArea, getSide, setSide
* Triangle
* getArea, getHeight, getBase, setBase
* ThreeDemensionalShape
* getArea
* Sphere
* getRadius, setRadius, getVolume
* Cube
* getArea, setArea, getVolume
* Cone
* getRadius, setRadius, getHeight, setHeight, getVolume
* Torus
* getMajorRadius, setMajorRadius, getMinorRadius, setMinorRadius, getVolume
* Cylinder
* getRadius, setRadius, getHeight, setHeight, getVolume

**User’s Guide**

1. All of my work is saved in a file pull up the file “CMSC335\_Project1
2. Make sure to have Netbeans application preferer Apaache Netbeans 11.2.pkg/ 12.0.pkg if you are using other application just pull up the classes.
3. Open src 🡪 Main 🡪 Java 🡪 Com 🡪 Mycompany 🡪 CMSC335\_Project1. To see all classes.
4. The reason I had to open so many files is because I am using the Terminal Netbeans option. Command is “sh Netbeans” and the application will open if you have JDK install.
5. I had problem Installing Apache NetBeans 12.0.pkg

Graphical user interface, text

Description automatically generated

1. After opening the Application open the project “CMSC335\_project1 and run the file. It should be able run compile the classes and get you the result desire.

Graphical user interface, application, table

Description automatically generated

**Compiled:**

**Graphical user interface, text, application, email

Description automatically generatedTest case Input/ Images:**

**Test case 1:**

**Select from the menu below:**

1

You have selected a Circle

**Enter Radius**

4

**The area of the Circle is:** 50.24

**Expected:** 50.24

**Would you like to Continue? (Y or N)**

Image:

Graphical user interface, text, application, email

Description automatically generated

**Test case 2:**

**Select from the menu below:**

2

You have selected a Rectangle

**Enter Width**

4

**Enter Length**

6

**The area of the Rectangle is**: 24.0

**Expected:** 24.0

**Would you like to continue? (Y or N)**

Image:

**Graphical user interface, text, application

Description automatically generated**

Test case 3:

**Select from the menu below:**

3

You have selected a Square

**Enter Side:**

20

**The area of the Square is:** 400.0

**Expected:** 400.0

**Would you like to continue? (Y or N)**

Image:

Graphical user interface, text, application, email

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**Test case 4:**

**Select from the menu below:**

4

You have selected a Triangle

**Enter Height**

6

**Enter Base**

10

**The area of the Triangle is:** 30.0

**Expected:** 30.0

**Would you like to continue? (Y or N)**

Image:

Graphical user interface, application

Description automatically generated

**Test case 5:**

**Select from the menu below:**

5

You have selected a Sphere

**Enter Radius**

20

**The Volume of the Sphere is:** 25120.0

**Expected:** 25120.0

**Would you like to continue? (Y or N)**

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Graphical user interface, application, Word

Description automatically generated

**Test case 6:**

**Select from the menu below:**

6

You have selected a Cube

**Enter Area**

5

**The Volume of the Cube is:** 125.0

**Expected:** 125.0

**Would you like to continue? (Y or N)**

Image:

**Graphical user interface, text, application, email

Description automatically generated**

**Test case 7:**

**Select from the menu below:**

7

You have selected a Cone

**Enter Radius**

10

**Enter Height**

15

**The Volume of the Cone is:** 1570.0

**Expected:** 1570.0

**Would you like to continue? (Y or N)**

Image:

Graphical user interface, text, application

Description automatically generated

**Test case 8:**

**Select from the menu below:**

8

You have selected a Cylinder

**Enter Radius**

8

**Enter Height**

13

The Volume of the Cylinder is: 2612.48

**Expected:** 2612.48

**Would you like to continue? (Y or N)**

Image:

Graphical user interface, text, application, email

Description automatically generated

**Test case 9:**

**Select from the menu below:**

9

You have selected a Torus

Enter MinorRadius

Enter MajorRadius

The Volume of the Torus is: 36914.342399999994

Expected: 36914.342399999994

**Would you like to continue? (Y or N)**

Image:

**Graphical user interface, text, application, email

Description automatically generated**

**Test case 10:**

**Select from the menu below:**

10

**Would you like to continue? (Y or N)**

N

Thanks for using the program. Today is Jan 26 04:11 PM

BUILD SUCCESS

Image:

Graphical user interface, text, application, email

Description automatically generated

**Lesson Learned:**

For this project I learned a few things. I learned how to use swing components to create and design a GUI. I have not done that in any of my previous programming classes. That took a few tries to get it stable and work. I also learned about getting a text file to be opened and read line by line. That was something I have not tried yet. This project overall was a challenge but not so challenging that it could not be done. I was able to try new techniques. I did come across a few error but I was able to fix those error and get the result I needed.