**Course**: Principals of Software Development – ENSF 409

**Lab 5**

**Instructor**: M. Moshirpour

**Student Name**: Mitchell Sawatzky

**Date Submitted**: Feb 12, 2016

Exercise A

Geometry2.java

// import java.util.Iterator;

// import java.util.TreeSet;

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

public class Geometry2{

public static void main(String[] args) {

Rectangle r1 = new Rectangle(3.0, 4.0, 5.0, 6.0, "R1", new Colour("Black"));

Circle c1 = new Circle (13.0, 14.0, 15.0, "C1",new Colour ("Green"));

System.out.println("\nHere are the original values in r1:");

System.out.println(r1);

System.out.println("\nHere are the original values in c1:");

System.out.println(c1);

Rectangle r2 = new Rectangle(23.0, 24.0, 25.0, 26.0, "R2", new Colour("Black"));

Circle c2 = new Circle (33.0, 34.0, 35.0, "C2", new Colour("Yellow"));

System.out.println("\nHere are the original values in r2:");

System.out.println(r2);

System.out.println("Here are the original values in c2:");

System.out.println(c2);

Prism p1 = new Prism(43.0, 44.0, 45.0, 46.0, 47.0, "P1", new Colour("White"));

Prism p2 = new Prism (53.0, 54.0, 55.0, 56.0, 57.0, "P2", new Colour("Gray"));

System.out.println("\nHere are the original values in p1:");

System.out.println(p1);

System.out.println("\nHere are the original values in p2:");

System.out.println(p2);

// THE FOLLOWING CODE SEGMENT MUST BE UNCOMMENTED ONLY FOR EXERCISE A in Lab 5

// EXERCISE\_A\_BEGINS

System.out.println("\n\nMaking r1 copy of r2, c1 copy of c2, p1 copy of p2:");

try {

r1 = (Rectangle)r2.clone();

c1 = (Circle)c2.clone();

p1 = (Prism)p2.clone();

} catch (CloneNotSupportedException e) {

System.out.println("Can't clone!");

}

r2.set\_length(1000.0);

r2.getOrigin().setx(88.0);

r2.getOrigin().sety(99.0);

r2.name.setText("");

c2.set\_radius(2000.00);

c2.getOrigin().setx(188.0);

c2.getOrigin().sety(199.0);

c2.name.setText("");

p2.set\_height(3000.0);

p2.getOrigin().setx(88.0);

p2.getOrigin().sety(99.0);

p2.name.setText("");

System.out.println("\nHere are values for r1 after trying to make it a copy of r2:");

System.out.println(r1);

System.out.println("\nHere are values for c1 after trying to make it a copy of c2:");

System.out.println(c1);

System.out.println("\nHere are values for p1 after trying to make it a copy of p2:");

System.out.println(p1);

// EXERCISE\_A\_ENDS

// THE FOLLOWING CODE SEGMENT MUST BE UNCOMMENTED ONLY FOR EXERCISE B in Lab 5

// EXERCISE\_B\_BEGINS

/\*

try{

r1.enlarge(2.0);

r1.name.enlarge(3.0);

c1.shrink(2.0);

p1.enlarge(0.5);

} catch(SizeFactorException e){

System.out.println(e.getMessage());

}

System.out.println("\nHere are values for r1 after calling enlarge(2.0):");

System.out.println(r1);

System.out.println("\nHere is the font size for r1.name after calling enlarge(3.0):");

System.out.println(r1.name.getFontSize());

System.out.println("\nHere are values for c1 after calling shrink (2.0):");

System.out.println(c1);

System.out.println("\nHere are values for p1 after calling shrink (0.5):");

System.out.println(p1);

try{

p1.enlarge(0.5);

} catch(SizeFactorException e){

System.out.println(e.getMessage());

}

System.out.println("\nHere are values for p1 after calling shrink (0.5) -- UNCHANGED:");

System.out.println(p1);

\*/

// EXERCISE\_B\_ENDS

}

}

Prism.java

class Prism extends Rectangle implements Cloneable {

private Double height;

public Prism(Double x, Double y, Double l, Double w, Double h, String name, Colour colour)

{

super(x, y, l, w, name, colour);

height = h;

}

public Object clone() throws CloneNotSupportedException {

return super.clone();

}

public void set\_height(Double h)

{

height = h;

}

public Double height()

{

return height;

}

public Double area()

{

return 2 \* (length \* width) + 2 \* (height \* length) + 2 \* (height \* width);

}

public Double perimeter()

{

return width \* 2 + length \* 2;

}

public Double volume()

{

return width \* length \* height;

}

public String toString()

{

String s = super.toString()+ "\nheight: " + height;

return s;

}

}

Rectangle.java

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

class Rectangle extends Shape implements Cloneable

{

protected Double width, length;

public Rectangle(Double x\_origin, Double y\_origin, Double newlength, Double newwidth, String name, Colour colour){

super(x\_origin, y\_origin, name, colour);

length= newlength;

width =newwidth;

}

public Object clone() throws CloneNotSupportedException {

return super.clone();

}

protected void set\_length(Double newlength){

length = newlength;

}

protected Double get\_length() {

return length;

}

protected Double area(){

return width \*length;

}

protected Double perimeter(){

return width \* 2 + length \* 2;

}

protected Double volume(){

return 0.0;

}

@Override

public String toString(){

String s = super.toString()+ "\nWidth: " + width + "\nLength: " + length;

return s;

}

}

Shape.java

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

abstract class Shape implements Cloneable

{

protected Point origin;

protected Text name;

abstract protected Double area();

abstract protected Double perimeter();

abstract protected Double volume();

protected Shape(Double x\_origin, Double y\_origin, String name, Colour colour){

origin = new Point(x\_origin,y\_origin, colour);

this.name = new Text(name);

}

protected Point getOrigin()

{

return origin;

}

public Object clone() throws CloneNotSupportedException {

Shape obj = (Shape)super.clone();

obj.origin = (Point)origin.clone();

obj.name = (Text)name.clone();

return obj;

}

protected Double distance( Shape other)

{

return origin.distance(other.origin);

}

protected Double distance( Shape a, Shape b)

{

return Point.distance(a.origin, b.origin);

}

protected void move(Double dx, Double dy)

{

origin.setx(origin.getx()+dx);

origin.sety(origin.gety()+dy);

}

@Override

public String toString(){

String s = "\nShape name: " + name + "\nOrigin: " + origin;

return s;

}

}

Text.java

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

class Text implements Cloneable

{

private final Double DEFAULT\_SIZE = 10.0;

private Colour colour;

private Double fontSize;

private String text;

public Text(String text) {

this.text = text;

fontSize = DEFAULT\_SIZE;

}

public Object clone() throws CloneNotSupportedException {

Text obj = (Text)super.clone();

if (colour != null)

obj.colour = (Colour)colour.clone();

return obj;

}

public Double getFontSize(){

return fontSize;

}

public void setColour(String s){

colour = new Colour(s);

}

public void setText(String newText){

text = newText;

}

public String getText(){

return text ;

}

@Override

public String toString(){

return (text);

}

}

Point.java

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

class Point implements Cloneable

{

private Colour colour;

private Double xCoordinate, yCoordinate;

public Point(Double a, Double b, Colour c){

colour = (c);

xCoordinate = a;

yCoordinate = b;

}

public Object clone() throws CloneNotSupportedException {

Point obj = (Point)super.clone();

obj.colour = (Colour)colour.clone();

return obj;

}

@Override

public String toString() {

String s;

s = "X\_coordinate: " + xCoordinate + "\nY-coordinate: " + yCoordinate +

"\n" + colour + " point" ;

return s;

}

public Double getx() {

return xCoordinate;

}

void setx(Double newvalue){

xCoordinate = newvalue;

}

public Double gety() {

return yCoordinate;

}

public void sety(Double newvalue){

yCoordinate = newvalue;

}

public Double distance(Point other){

Double dist\_x = other.xCoordinate - xCoordinate;

Double dist\_y = other.yCoordinate - yCoordinate;

return (Math.sqrt(Math.pow(dist\_x, 2) + Math.pow(dist\_y, 2)));

}

static Double distance (Point that, Point other){

Double dist\_x = other.xCoordinate - that.xCoordinate;

Double dist\_y = other.yCoordinate - that.yCoordinate;

return (Math.sqrt(Math.pow(dist\_x, 2) + Math.pow(dist\_y, 2)));

}

}

Colour.java

/\*

\* started by: M. Moussavi

\* Date: Feb 2015

\* Modified by: Mitchell Sawatzky

\*/

class Colour implements Cloneable

{

private String colour;

public Colour(String s) {

colour = new String(s);

}

public Object clone() throws CloneNotSupportedException {

return super.clone();

}

public void setColour(String newColour){

colour = newColour;

}

@Override

public String toString(){

return colour;

}

}

Circle.java

class Circle extends Shape implements Cloneable

{

private Double radius;

Circle(Double x\_origin, Double y\_origin, Double newradius, String name, Colour colour){

super(x\_origin, y\_origin, name, colour);

radius = newradius;

}

public Object clone() throws CloneNotSupportedException {

return super.clone();

}

public void set\_radius(Double newradius){

radius = newradius;

}

public Double get\_radius() {

return radius;

}

public Double area() {

return Math.PI \* Math.pow(radius, 2);

}

public Double perimeter() {

return 2 \* Math.PI \* radius;

}

public Double volume(){

return 0.0;

}

public String toString(){

String s = super.toString()+ "\nRadius: " + radius;

return s;

}

}

Terminal Output:

Here are the original values in r1:

Shape name: R1

Origin: X\_coordinate: 3.0

Y-coordinate: 4.0

Black point

Width: 6.0

Length: 5.0

Here are the original values in c1:

Shape name: C1

Origin: X\_coordinate: 13.0

Y-coordinate: 14.0

Green point

Radius: 15.0

Here are the original values in r2:

Shape name: R2

Origin: X\_coordinate: 23.0

Y-coordinate: 24.0

Black point

Width: 26.0

Length: 25.0

Here are the original values in c2:

Shape name: C2

Origin: X\_coordinate: 33.0

Y-coordinate: 34.0

Yellow point

Radius: 35.0

Here are the original values in p1:

Shape name: P1

Origin: X\_coordinate: 43.0

Y-coordinate: 44.0

White point

Width: 46.0

Length: 45.0

height: 47.0

Here are the original values in p2:

Shape name: P2

Origin: X\_coordinate: 53.0

Y-coordinate: 54.0

Gray point

Width: 56.0

Length: 55.0

height: 57.0

Making r1 copy of r2, c1 copy of c2, p1 copy of p2:

Here are values for r1 after trying to make it a copy of r2:

Shape name: R2

Origin: X\_coordinate: 23.0

Y-coordinate: 24.0

Black point

Width: 26.0

Length: 25.0

Here are values for c1 after trying to make it a copy of c2:

Shape name: C2

Origin: X\_coordinate: 33.0

Y-coordinate: 34.0

Yellow point

Radius: 35.0

Here are values for p1 after trying to make it a copy of p2:

Shape name: P2

Origin: X\_coordinate: 53.0

Y-coordinate: 54.0

Gray point

Width: 56.0

Length: 55.0

height: 57.0