Homework 5

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Problem 5.1

Rectangle.java

```
package homework_5;

public class Rectangle {
    double width;
    double length;
    double x0;
    double y0;

    Rectangle(double width, double length){
        this.width = width;
        this.length = length;
    }

    Rectangle(double width, double length, double x, double y){
        this.width = width;
        this.length = length;
        this.x0 = x;
        this.y0 = y;
    }

    Rectangle(double size){
        this.width = size;
        this.length = size;
    }

    public double getWidth(){
        return this.width;
    }

    public double getLength(){
        return this.length;
    }

    public double getX(){
        return this.x0;
    }

    public double getY(){
        return this.y0;
    }

    public double getArea(){
```

```
        return this.width * this.length;
    }

    public boolean isLargerThan(Rectangle r){
        return this.getArea() > r.getArea();
    }

    public boolean isIntersectingWith(Rectangle r) {
        //Coordinate & height, length value of the current rect
        double x1 = this.x0;
        double y1 = this.y0;
        double w1 = this.width;
        double l1 = this.length;

        //Coordinate & height, length value of the compared rect
        double x2 = r.x0;
        double y2 = r.y0;
        double w2 = r.width;
        double l2 = r.length;

        boolean xOverlap = Math.min(x1 + w1, x2 + w2) > Math.max(x1, x2);
        boolean yOverlap = Math.min(y1 + l1, y2 + l2) > Math.max(y1, y2);

        return (xOverlap && yOverlap) ? true : false;
    }

}
```

Problem 5.2

Cube.java

```
package homework_5;

public class Cube extends Rectangle{
    double height;
    double z0;

    Cube(double size){
        super(size, size);
        this.height = size;
    }

    Cube(double width, double length, double height, double x, double y,
double z){
        super(width, length, x, y);
        this.height = height;
        this.z0 = z;
```

```
    }

    Cube(double width, double length, double height){
        super(width, length);
        this.height = height;
    }

    public double getHeight(){
        return this.height;
    }

    public double getArea(){
        return(6 * super.getArea());
    }

    public double getVolume(){
        return super.getArea() * this.height;
    }

    public boolean isLargerThan(Cube c){
        return this.getArea() > c.getArea();
    }

    public boolean isIntersectingWith(Cube c){
        super.isIntersectingWith(c);
        double z1 = this.z0;
        double h1 = this.height;

        double z2 = c.z0;
        double h2 = c.height;

        boolean zOverlap = Math.min(z1 + h1, z2 + h2) > Math.max(z1, z2);

        return (super.isIntersectingWith(c) && zOverlap) ? true : false;
    }
}
```

TestHomework.java

```
package homework_5;

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

        Rectangle rect1 = new Rectangle(5.0);
        Rectangle rect2 = new Rectangle(2.5, 6.0);
        Rectangle rect3 = new Rectangle(4, 6.0, 7.0, 8.0);
```

```
        System.out.println("Rectangle 1 Info: \nWidth = " + rect1.getWidth()
+ " Height = " + rect1.getLength() + " Coordinate X: " + rect1.getX() + "
Coordinate Y: " + rect1.getY());
        System.out.println("Rectangle 2 Info: \nWidth = " + rect2.getWidth()
+ " Height = " + rect2.getLength() + " Coordinate X: " + rect2.getX() + "
Coordinate Y: " + rect2.getY());
        System.out.println("Rectangle 3 Info: \nWidth = " + rect3.getWidth()
+ " Height = " + rect3.getLength() + " Coordinate X: " + rect3.getX() + "
Coordinate Y: " + rect3.getY());

        System.out.println("\nArea Rectangle 1: " + rect1.getArea());
        System.out.println("Area Rectangle 2: " + rect2.getArea());
        System.out.println("Area Rectangle 3: " + rect3.getArea());

        System.out.println("\nCheck if R1 is Larger than R2: " +
rect1.isLargerThan(rect2));
        System.out.println("Check if R2 is Larger than R3: " +
rect2.isLargerThan(rect3));
        System.out.println("Check if R3 is Larger than R1: " +
rect3.isLargerThan(rect1));

        System.out.println("\nCheck if R1 is Intersecting with R2: " +
rect1.isIntersectingWith(rect2));
        System.out.println("Check if R1 is Intersecting with R3: " +
rect1.isIntersectingWith(rect3));
        System.out.println("Check if R2 is Intersecting with R3: " +
rect2.isIntersectingWith(rect3));

        Cube cube1 = new Cube(5.0);
        Cube cube2 = new Cube(2.5, 6.0, 4.5);
        Cube cube3 = new Cube(2.9, 3.3, 1.2, 5.0, 7.0, 3.0);

        System.out.println("Cube 1 Info: \nWidth = " + cube1.getWidth() + "
Length = " + cube1.getLength() + " Height = " + cube1.getHeight() + "
Coordinate X: " + cube1.getX() + " Coordinate Y: " + cube1.getY());
        System.out.println("Cube 2 Info: \nWidth = " + cube2.getWidth() + "
Length = " + cube2.getLength() + " Height = " + cube2.getHeight() +"
Coordinate X: " + cube2.getX() + " Coordinate Y: " + cube2.getY());
        System.out.println("Cube 3 Info: \nWidth = " + cube3.getWidth() + "
Length = " + cube3.getLength() + " Height = " + cube3.getHeight() + "
Coordinate X: " + cube3.getX() + " Coordinate Y: " + cube3.getY());

        System.out.println("\nSurface Area Cube 1: " + cube1.getArea());
        System.out.println("Surface Area Cube 2: " + cube2.getArea());
        System.out.println("Surface Area Cube 3: " + cube3.getArea());

        System.out.println("\nCheck if C1 is Larger than C2: " +
cube1.isLargerThan(cube2));
```

```
        System.out.println("Check if C2 is Larger than C3: " +
cube2.isLargerThan(cube3));
        System.out.println("Check if C3 is Larger than C1: " +
cube3.isLargerThan(cube1));

        System.out.println("\nCheck if C1 is Intersecting with C2: " +
cube1.isIntersectingWith(cube2));
        System.out.println("Check if C1 is Intersecting with C3: " +
cube1.isIntersectingWith(cube3));
        System.out.println("Check if C2 is Intersecting with C3: " +
cube2.isIntersectingWith(cube3));

    }
}
```

Output for Problem 5.1 & Problem 5.2

```
Rectangle 1 Info:
Width = 5.0 Height = 5.0 Coordinate X: 0.0 Coordinate Y: 0.0
Rectangle 2 Info:
Width = 2.5 Height = 6.0 Coordinate X: 0.0 Coordinate Y: 0.0
Rectangle 3 Info:
Width = 4.0 Height = 6.0 Coordinate X: 7.0 Coordinate Y: 8.0

Area Rectangle 1: 25.0
Area Rectangle 2: 15.0
Area Rectangle 3: 24.0

Check if R1 is Larger than R2: true
Check if R2 is Larger than R3: false
Check if R3 is Larger than R1: false

Check if R1 is Intersecting with R2: true
Check if R1 is Intersecting with R3: false
Check if R2 is Intersecting with R3: false


Cube 1 Info:
Width = 5.0 Length = 5.0 Height = 5.0 Coordinate X: 0.0 Coordinate Y: 0.0
Cube 2 Info:
Width = 2.5 Length = 6.0 Height = 4.5 Coordinate X: 0.0 Coordinate Y: 0.0
Cube 3 Info:
Width = 2.9 Length = 3.3 Height = 1.2 Coordinate X: 5.0 Coordinate Y: 7.0

Surface Area Cube 1: 150.0
Surface Area Cube 2: 90.0
Surface Area Cube 3: 57.41999999999999
```

```
Check if C1 is Larger than C2: true
Check if C2 is Larger than C3: true
Check if C3 is Larger than C1: false

Check if C1 is Intersecting with C2: true
Check if C1 is Intersecting with C3: false
Check if C2 is Intersecting with C3: false
```

```
etailsInExceptionMessages' '-cp' 'C:\Users\themi\Downloads\java-prak-asd\fifth-m
Rectangle 1 Info:
Width = 5.0 Height = 5.0 Coordinate X: 0.0 Coordinate Y: 0.0
Rectangle 2 Info:
Width = 2.5 Height = 6.0 Coordinate X: 0.0 Coordinate Y: 0.0
Rectangle 3 Info:
Width = 4.0 Height = 6.0 Coordinate X: 7.0 Coordinate Y: 8.0

Area Rectangle 1: 25.0
Area Rectangle 2: 15.0
Area Rectangle 3: 24.0

Check if R1 is Larger than R2: true
Check if R2 is Larger than R3: false
Check if R3 is Larger than R1: false

Check if R1 is Intersecting with R2: true
Check if R1 is Intersecting with R3: false
Check if R2 is Intersecting with R3: false


Cube 1 Info:
Width = 5.0 Length = 5.0 Height = 5.0 Coordinate X: 0.0 Coordinate Y: 0.0
Cube 2 Info:
Width = 2.5 Length = 6.0 Height = 4.5 Coordinate X: 0.0 Coordinate Y: 0.0
Cube 3 Info:
Width = 2.9 Length = 3.3 Height = 1.2 Coordinate X: 5.0 Coordinate Y: 7.0

Surface Area Cube 1: 150.0
Surface Area Cube 2: 90.0
Surface Area Cube 3: 57.41999999999999

Check if C1 is Larger than C2: true
Check if C2 is Larger than C3: true
Check if C3 is Larger than C1: false

Check if C1 is Intersecting with C2: true
Check if C1 is Intersecting with C3: false
Check if C2 is Intersecting with C3: false
```