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Lab Works for Algorithm and Data Structures

Homework 2

2.1

1.

```
public class Rectangle {
    double width;
    double height;
}
public class TestRectangle {
    public static void main(String[] args) {
        Rectangle rect0 = new Rectangle();
        rect0.width = Math.random();
        rect0.height = Math.random();

        Rectangle rect1 = new Rectangle();
        rect1.width = Math.random();
        rect1.height = Math.random();

        System.out.println("rect0");
        System.out.println("width\t: " + rect0.width);
        System.out.println("height\t: " + rect0.height);
        System.out.println("area\t: " + rect0.width *
rect0.height);

        System.out.println("rect1");
        System.out.println("width\t: " + rect1.width);
        System.out.println("height\t: " + rect1.height);
        System.out.println("area\t: " + rect1.width *
rect1.height);
    }
}
 C:\Users\ASUS\.jdks\openjdk-19.0.2\bi
 rect0
 width   : 0.4890152428967893
 height  : 0.7321637806810374
 area    : 0.3580392490499691
 rect1
 width   : 0.9422270512757285
 height  : 0.13974671497497637
 area    : 0.1316731351763417

 Process finished with exit code 0
```

2.

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

        Rectangle[] rects = new Rectangle[2];

        for (int i=0; i<2; i++){
            Rectangle rect = new Rectangle();
            rect.width = Math.random();
            rect.height = Math.random();
            rects[i] = rect;
        }

        for (int i=0; i<2; i++){
            System.out.println("rect" + i);
            System.out.println("width\t: " + rects[i].width);
            System.out.println("height\t: " + rects[i].height);
            System.out.println("area\t: " + rects[i].width *
rects[i].height);
        }
    }
}
C:\Users\ASUS\.jdks\openjdk-19.0.2\b
rect0
width   : 0.8888187291031522
height  : 0.026327713285967724
area    : 0.023400564663026008
rect1
width   : 0.024912155654856827
height  : 0.5469559195151376
area    : 0.01362585100330645

Process finished with exit code 0
```

3.

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

        Rectangle[] rects = new Rectangle[10];

        for (int i=0; i<10; i++){
            Rectangle rect = new Rectangle();
            rect.width = Math.random();
            rect.height = Math.random();
            rects[i] = rect;
        }

        for (int i=0; i<10; i++){
            System.out.println("rect" + i);
            System.out.println("width\t: " + rects[i].width);
```

```
            System.out.println("height\t: " + rects[i].height);
            System.out.println("area\t: " + rects[i].width *
rects[i].height);
        }
    }
}
C:\Users\ASUS\.jdks\openjdk-19.
rect0
width    : 0.49219636291689994
height   : 0.18391378051743557
area     : 0.0905216938609788
rect1
width    : 0.29256621862662
height   : 0.41307997738477953
area     : 0.12085324697383466
rect2
width    : 0.5139293434598288
height   : 0.3191633122304194
area     : 0.16402739151104376
rect3
width    : 0.7958528017489253
height   : 0.34221939345147245
area     : 0.27235626309117217
rect4
width    : 0.35636420976424754
height   : 0.5707226821849093
area     : 0.203385137631357
rect5
width    : 0.7577888328375164
height   : 0.4222568258418954
area     : 0.31998150721240437
rect6
width    : 0.030256183698120998
height   : 0.606821586130298
area     : 0.0183601053819434 5
rect7
width    : 0.8125937828770039
height   : 0.020688906890751313
area     : 0.01681167711394572
rect8
width    : 0.7501634822743314
height   : 0.48647479817018
area     : 0.3649356286340448
rect9
width    : 0.901712531807975
height   : 0.1102918469812143
area     : 0.0994515405792085

Process finished with exit code
```

4.

```
public class Rectangle {
    double width;
    double height;
    double area;
}
public class TestRectangle {
    public static void main(String[] args) {

        Rectangle[] rects = new Rectangle[10];

        for (int i=0; i<10; i++){
            Rectangle rect = new Rectangle();
            rect.width = Math.random();
            rect.height = Math.random();
            rect.area = rect.height * rect.width;
            rects[i] = rect;
        }
```

```
        double largest = 0;
        int largestID = 0;
        double smallest = 1;
        int smallestID = 0;

        for (int i=0; i<10; i++){
            if (rects[i].area > largest){
                largest = rects[i].area;
                largestID = i;
            }
        }

        for (int i=0; i<10; i++){
            if (rects[i].area < smallest){
                smallest = rects[i].area;
                smallestID = i;
            }
        }

        System.out.println("The largest rectangle is rect" +
largestID);
        System.out.println("width\t: " + rects[largestID].width);
        System.out.println("height\t: " +
rects[largestID].height);
        System.out.println("area\t: " + rects[largestID].area);

        System.out.println("The smallest rectangle is rect" +
smallestID);
        System.out.println("width\t: " + rects[smallestID].width);
        System.out.println("height\t: " +
rects[smallestID].height);
        System.out.println("area\t: " + rects[smallestID].area);


    }
}
```

```
C:\Users\ASUS\.jdks\openjdk-19.0.2\bin\java.exe
The largest rectangle is rect1
width   : 0.6218907790389415
height  : 0.8139617869464868
area    : 0.5061953297920796
The smallest rectangle is rect9
width   : 0.06312393643733039
height  : 0.056656366675729375
area    : 0.0035763728888088247

Process finished with exit code 0
```

2.2

```
public class Buku {
    String judul;
    String penulis;
    int harga;
}
public class TestBook {
    public static void main(String[] args) {
        Buku[] bukubuku = new Buku[3];

        Buku buku0 = new Buku();
        bukubuku[0] = buku0;
        bukubuku[0].judul = "Introduction to Java Programming and
Data Structures";
        bukubuku[0].penulis = "Daniel Liang";
        bukubuku[0].harga = 355000;

        Buku buku1 = new Buku();
        bukubuku[1] = buku1;
        bukubuku[1].judul = "Advanced Java Programming";
        bukubuku[1].penulis = "Uttam Roy";
        bukubuku[1].harga = 236250;

        Buku buku2 = new Buku();
        bukubuku[2] = buku2;
        bukubuku[2].judul = "Practical Java Programming";
        bukubuku[2].penulis = "Perry Xiao";
        bukubuku[2].harga = 95000;

        for (int i=0; i<3; i++){
            bukubuku[i].harga += (bukubuku[i].harga/10);
        }

        for (int i=0; i<3; i++){
            System.out.println("Judul\t: " + bukubuku[i].judul);
            System.out.println("Penulis\t: " +
bukubuku[i].penulis);
            System.out.println("Harga\t: Rp." +
bukubuku[i].harga);
        }
    }
}
C:\Users\ASUS\.jdks\openjdk-19.0.2\bin\java.exe
Judul   : Introduction to Java Programming and I
Penulis : Daniel Liang
Harga   : Rp.390500
Judul   : Advanced Java Programming
Penulis : Uttam Roy
Harga   : Rp.259875
Judul   : Practical Java Programming
Penulis : Perry Xiao
Harga   : Rp.104500

Process finished with exit code 0
```

2.3

```
public class LineLength {
    public static void main(String[] args) {
        Line line = new Line();

        line.p0 = new Point();
        line.p0.x = 5;
        line.p0.y = 4;

        line.p1 = new Point();
        line.p1.x = 13;
        line.p1.y = 9;

        double d;
        int width = line.p1.x - line.p0.x;
        int height = line.p1.y - line.p0.y;
        d = Math.sqrt(Math.pow(width,2) + Math.pow(height,2));
        System.out.println("the length of the line is "+d);
    }
C:\Users\ASUS\.jdks\openjdk-19.0.2\bin\java.exe '
the length of the line is 9.433981132056603

Process finished with exit code 0
```