Task 3

Subject	Data Structure and Algorithm
Lecturer	Imam Fahrur Rozi ST. MT.
Type	Assignment
Semester	Semester 2
Time	@March 2, 2023
Files & Media	

1.2

```
public class Rectangle
{
    public int length;
    public int width;
}
```

```
public class ArrayOfObjects
{
    public static void main(String[] args)
    {
        Rectangle[] rectangleArray = new Rectangle[3];
        rectangleArray[0] = new Rectangle();
        rectangleArray[0].length = 110;
        rectangleArray[0].width = 30;

        rectangleArray[1] = new Rectangle();
        rectangleArray[1].length = 80;
        rectangleArray[1].width = 40;

        rectangleArray[2] = new Rectangle();
        rectangleArray[2].length = 100;
        rectangleArray[2].width = 20;

        System.out.println("First rectangle, width: " + rectangleArray[0].width + ", length: " + rectangleArray[0].length);
        System.out.println("Second rectangle, width: " + rectangleArray[0].width + ", length: " + rectangleArray[0].length);
        System.out.println("Third rectangle, width: " + rectangleArray[0].width + ", length: " + rectangleArray[0].length);
    }
}
```

```
"C:\Program Files\Java\jdk1.8.0_121\bin\java.exe" ...
First rectangle, width: 30, length: 110
Second rectangle, width: 30, length: 110
Third rectangle, width: 30, length: 110

Process finished with exit code 0
```

Question

1. no, because it only needed the main class
2. no, because if we want to fill the array, we have to do so to instantiate it
3. that line of code is to create a new array called rectangleArray and it contain 3 array
4. that line is used to instantiate the array of object, it used to determine the width and length of the object
5. because they have different purpose on each class

1.3

```
package ArrayOfObjects;
import java.util.Scanner;

public class Rectangle
{
    public int length;
    public int width;
}
```

```
package ArrayOfObjects;
import java.util.Scanner;

public class ArrayOfObjects
{
    public static void main(String[] args)
    {
        Rectangle[] rectangleArray = new Rectangle[3];
        Scanner sc = new Scanner(System.in);

        for (int i = 0; i < 3; i++)
        {
            rectangleArray[i] = new Rectangle();
            System.out.println("Rectangle " + i);

            System.out.print("input length : ");
            rectangleArray[i].length = sc.nextInt();

            System.out.print("Input width : ");
            rectangleArray[i].width = sc.nextInt();
        }

        for (int i = 0; i < 10; i++)
        {
            System.out.println("Rectangle " + i);
            System.out.println("width: " + rectangleArray[0].width + ", length: " + rectangleArray[0].length);
        }
    }
}
```

```
"C:\Program Files\Java\jdk1.8.0_121\bin\java.exe" ...
Rectangle 0
input length : 10
Input width : 20
Rectangle 1
input length : 30
Input width : 40
Rectangle 2
input length : 50
Input width : 60
Rectangle 0
width: 20, length: 10
Rectangle 1
width: 20, length: 10
Rectangle 2
width: 20, length: 10
Rectangle 3
width: 20, length: 10
Rectangle 4
width: 20, length: 10
Rectangle 5
width: 20, length: 10
Rectangle 6
width: 20, length: 10
Rectangle 7
width: 20, length: 10
Rectangle 8
width: 20, length: 10
Rectangle 9
width: 20, length: 10

Process finished with exit code 0
```

Question

1. yes it does, because 2d array is actually array of array so it's still possible
2. code

```
Blocks[] blArray = new Blocks[3];
blArray[0] = new Blocks(100, 30, 12);
blArray[1] = new Blocks(120, 40, 15);
blArray[2] = new Blocks(210, 50, 25);
```

3. because we haven't initialized the array, by default array is Null where they don't have an actual Square object. also we don't have any attributes or methods for side
4. code

```
package ArrayOfObjects;
import java.util.Scanner;

public class ArrayOfObjects
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Input the number of array: ");
        int j = sc.nextInt();
        Rectangle[] rectangleArray = new Rectangle[j];

        for (int i = 0; i < j; i++)
        {
```

```
            rectangleArray[i] = new Rectangle();
            System.out.println("Rectangle " + i);

            System.out.print("input length : ");
            rectangleArray[i].length = sc.nextInt();

            System.out.print("Input width : ");
            rectangleArray[i].width = sc.nextInt();
        }

        for (int i = 0; i < 10; i++)
        {
            System.out.println("Rectangle " + i);
            System.out.println("width: " + rectangleArray[0].width + ", length: " + rectangleArray[0].length);
        }
    }
}
```

5. yes, it's possible, it will effect both of the instantiation if we accessed through one of it

1.4

```
package ArrayBlock;

public class Blocks
{
    public int width, length, height;

    public Blocks(int p, int l, int t)
    {
        length = p;
        width = l;
        height = t;
    }

    public int countVolume()
    {
        return length*width*height;
    }
}
```

```
package ArrayBlock;

public class ArrayBlocks
{
    public static void main(String[] args)
    {
        Blocks[] blArray = new Blocks[3];

        blArray[0] = new Blocks(100, 30, 12);
        blArray[1] = new Blocks(120, 40, 15);
        blArray[2] = new Blocks(210, 50, 25);

        for (int i = 0; i < 3;i++)
        {
            System.out.println("Volume blocks - " + i + " : " + blArray[i].countVolume());
        }
    }
}
```

Question

1. yes it's possible, as long they have their own parameter lists
2. code

```
public class Triangle
{
    public int a;
    public int t;

    public Triangle()
```

```
    {
        this.a = 0;
        this.t = 0;
    }

    public Triangle (int a, int t)
    {
        this.a = a;
        this.t = t;
    }
}
```

3. code

```
package Triangle;

public class Triangle
{
    public int a;
    public int t;

    public Triangle()
    {
        this.a = 0;
        this.t = 0;
    }

    public Triangle (int a, int t)
    {
        this.a = a;
        this.t = t;
    }

    public double countArea()
    {
        return this.a * this.t * 0.5;
    }

    public double countPerimeter()
    {
        double perimeter = Math.sqrt(this.a * this.a + this.t * this.t);
        return this.a + this.t + perimeter;
    }
}
```

4. code

```
package Triangle;

public class TriangleMain
{
    public static void main(String[] args)
    {
        Triangle[] triangleArray = new Triangle[4];
        triangleArray[0] = new Triangle(10,4);
        triangleArray[1] = new Triangle(20,10);
        triangleArray[2] = new Triangle(15,6);
        triangleArray[3] = new Triangle(25,10);

        for (int i = 0; i < 4; i++)
        {
            System.out.println("Area of the Triangle: " + triangleArray[i].countArea());
            System.out.println("Perimeter of the Triangle: " + triangleArray[i].countPerimeter());
        }
    }
}
```

5. result

```
Area of the Triangle: 20.0
Perimeter of the Triangle: 24.77032961426901
Area of the Triangle: 100.0
Perimeter of the Triangle: 52.3606797749979
Area of the Triangle: 45.0
Perimeter of the Triangle: 37.15549442140351
Area of the Triangle: 125.0
Perimeter of the Triangle: 61.92582403567252
```

1.5

1. Code

```
package Practice;

public class Block
{
    public int width, length, height;

    public Block()
    {
    }

    public int countSurfaceArea()
    {
        return 2*((width*length) + (length*height) + (width*height));
    }

    public int countVolume()
    {
        return length*width*height;
    }
}
```

```
package Practice;

public class Cube
{
    public int side;

    public Cube()
    {
    }

    public int countSurfaceArea()
    {
        return 6*side;
    }

    public int countVolume()
    {
        return side*side*side;
    }
}
```

```
package Practice;

public class Cylinder
{
    public int rad, height;

    public Cylinder()
    {
    }

    public double countSurfaceArea()
    {
        return 2*Math.PI*rad*rad+rad*height;
    }
```

```
    public double countVolume()
    {
        return Math.PI*rad*rad*height;
    }
}
```

```
package Practice;
import java.util.Scanner;
public class PracticeMain
{
    static Scanner sc = new Scanner(System.in);
    public static void blockAttributes()
    {
        System.out.print("Insert how much block you want: ");
        int j = sc.nextInt();
        Block[] blockArray = new Block[j];
        for (int i = 0; i < j; i++)
        {
            blockArray[i] = new Block();
            System.out.println("Block " + (i+1));

            System.out.print("input width: ");
            blockArray[i].width = sc.nextInt();
            System.out.print("input length: ");
            blockArray[i].length = sc.nextInt();
            System.out.print("input height: ");
            blockArray[i].height = sc.nextInt();
            System.out.println("Surface Area of Block " + (i+1) + ": " + blockArray[i].countSurfaceArea() + " and the Volume of the Block "
        }

    }

    public static void cubeAttributes()
    {
        System.out.print("Insert how much cube you want: ");
        int j = sc.nextInt();
        Cube[] cubeArray = new Cube[j];
        for (int i = 0; i < j; i++)
        {
            cubeArray[i] = new Cube();
            System.out.println("Cube " + (i+1));

            System.out.print("input side: ");
            cubeArray[i].side = sc.nextInt();
            System.out.println("Surface Area of Cube " + (i+1) + ": " + cubeArray[i].countSurfaceArea() + " and the Volume of the Cube " +
        }

    }

    public static void cylinderAttributes()
    {
        System.out.print("Insert how much cylinder you want: ");
        int j = sc.nextInt();
        Cylinder[] cylinderArray = new Cylinder[j];
        for (int i = 0; i < j; i++)
        {
            cylinderArray[i] = new Cylinder();
            System.out.println("Cylinder " + (i+1));

            System.out.print("input radius: ");
            cylinderArray[i].rad = sc.nextInt();
            System.out.print("input height: ");
            cylinderArray[i].height = sc.nextInt();
            System.out.println("Surface Area of Cylinder " + (i+1) + ": " + cylinderArray[i].countSurfaceArea() + " and the Volume of the C
        }

    }
    public static void main(String[] args)
    {

        int menu;
        do
        {
            System.out.println("---------------------");
            System.out.println("Select type of Object");
            System.out.println("1. Block");
            System.out.println("2. Cube");
            System.out.println("3. Cylinder");
```

```
            System.out.println("0. Exit");
            System.out.println("---------------------");
            menu = sc.nextInt();
            switch (menu)
            {
                case 1:
                    blockAttributes();
                    break;
                case 2:
                    cubeAttributes();
                    break;
                case 3:
                    cylinderAttributes();
                    break;
                case 0:
                    break;
                default:
                    System.out.println("Please Select Menu Correctly!");
            }
        }
        while (menu != 0);
    }
}
```

```
---------------------
Select type of Object
1. Block
2. Cube
3. Cylinder
0. Exit
---------------------
1
Insert how much block you want: 1
Block 1
input width: 3
input length: 4
input height: 5
Surface Area of Block 1: 94 and the Volume of the Block 1: 60
---------------------
Select type of Object
1. Block
2. Cube
3. Cylinder
0. Exit
---------------------
2
Insert how much cube you want: 2
Cube 1
input side: 5
Surface Area of Cube 1: 30 and the Volume of the Cube 1: 125
Cube 2
input side: 6
Surface Area of Cube 2: 36 and the Volume of the Cube 2: 216
---------------------
Select type of Object
1. Block
2. Cube
3. Cylinder
0. Exit
---------------------
3
Insert how much cylinder you want: 1
Cylinder 1
input radius: 7
input height: 10
Surface Area of Cylinder 1: 377.8760800517997 and the Volume of the Cylinder 1: 1539.3804002589986
---------------------
```

2. code

```
package Practice2;

public class Land
{
    public int length, width;

    public Land()
    {
    }

    public int landArea()
    {
        return length*width;
    }
}
```

```
package Practice2;
import java.util.Scanner;
public class LandMain
{
    static Scanner sc = new Scanner(System.in);
    public static void main(String[] args)
    {

        System.out.print("How many lands: ");
        int j = sc.nextInt();
        Land[] landArray = new Land[j];
        for (int i = 0; i < j; i++) {
            landArray[i] = new Land();
            System.out.println("Land " + (i + 1));

            System.out.print("Length: ");
            landArray[i].length = sc.nextInt();
            System.out.print("Width: ");
            landArray[i].width = sc.nextInt();
        }

        for (int i = 0; i < j; i++)
        {
            System.out.println("Land Area " + (i+1) + ": " + landArray[i].landArea());
        }
    }
}
```

```
How many lands: 3
Land 1
Length: 100
Width: 40
Land 2
Length: 250
Width: 100
Land 3
Length: 120
Width: 100
Land Area 1: 4000
Land Area 2: 25000
Land Area 3: 12000
```

3. code

```
package Practice2;

public class Land
{
    public int length, width;
```

```
    public Land()
    {
    }

    public int landArea()
    {
        return length*width;
    }

    public int widestArea(Land[] landArray)
    {
        int widestArea = 0, land = 0;
        for (int i = 0; i < landArray.length; i++)
        {
            if (landArray[i].landArea() > widestArea)
            {
                widestArea = landArray[i].landArea();
                land = i + 1;
            }
        }
        return land;
    }
}
```

```
package Practice2;
import java.util.Scanner;
public class LandMain
{
    static Scanner sc = new Scanner(System.in);
    public static void main(String[] args)
    {

        System.out.print("How many lands: ");
        int j = sc.nextInt();
        Land[] landArray = new Land[j];
        for (int i = 0; i < j; i++) {
            landArray[i] = new Land();
            System.out.println("Land " + (i + 1));

            System.out.print("Length: ");
            landArray[i].length = sc.nextInt();
            System.out.print("Width: ");
            landArray[i].width = sc.nextInt();
        }

        for (int i = 0; i < j; i++)
        {
            System.out.println("Land Area " + (i+1) + ": " + landArray[i].landArea());
        }

        System.out.println("The widest land is Land " + landArray[0].widestArea(landArray));
    }
}
```

```
How many lands: 3
Land 1
Length: 100
Width: 40
Land 2
Length: 250
Width: 100
Land 3
Length: 120
Width: 100
Land Area 1: 4000
Land Area 2: 25000
Land Area 3: 12000
The widest land is Land 2
```

4. code

```
package Practice3;

public class Student
{
    public String name, gender;
    public double ipk, nim;

    public Student()
    {
    }
}
```

```
package Practice3;
import java.util.Scanner;
public class StudentMain
{
    static Scanner sc = new Scanner(System.in);
    public static void main(String[] args)
    {
        Student[] studentArray = new Student[3];
        for (int i = 0; i < 3; i++)
        {
            studentArray[i] = new Student();
            System.out.println("Insert " + (i+1) + " student data");

            System.out.print("Insert name :");
            studentArray[i].name = sc.nextLine();
            System.out.print("Insert nim :");
            studentArray[i].nim = sc.nextDouble();
            sc.nextLine();
            System.out.print("Insert gender :");
            studentArray[i].gender = sc.nextLine();
            System.out.print("Insert IPK :");
            studentArray[i].ipk = sc.nextDouble();
            sc.nextLine();
        }

        for (int i = 0; i < 3; i++)
        {
            System.out.println(i + " Student Data");
            System.out.println("name : " + studentArray[i].name);
            System.out.println("nim : " + studentArray[i].nim);
            System.out.println("gender : " + studentArray[i].gender);
            System.out.println("IPK score : " + studentArray[i].ipk);
        }
    }
}
```

```
Insert 1 student data
Insert name :Rina
Insert nim :1234567
Insert gender :P
Insert IPK :3.5
Insert 2 student data
Insert name :Rio
Insert nim :7654321
Insert gender :L
Insert IPK :4.0
Insert 3 student data
Insert name :Reza
Insert nim :8765398
Insert gender :L
Insert IPK :3.8
0 Student Data
name : Rina
nim : 1234567.0
gender : P
IPK score : 3.5
1 Student Data
name : Rio
nim : 7654321.0
gender : L
IPK score : 4.0
2 Student Data
name : Reza
nim : 8765398.0
gender : L
IPK score : 3.8
```

5. code

```
package Practice3;

public class Student
{
    public String name, gender;
    public double ipk, nim;

    public Student()
    {
    }

    public double averageIPK(Student[] studentArray)
    {
        double averageIPK = 0;
        for (int i = 0; i < studentArray.length; i++)
        {
            averageIPK += studentArray[i].ipk;
        }
        return averageIPK / studentArray.length;
    }
}
```

```
package Practice3;
import java.util.Scanner;
public class StudentMain
{
    static Scanner sc = new Scanner(System.in);
    public static void main(String[] args)
    {
        Student[] studentArray = new Student[3];
        for (int i = 0; i < 3; i++)
        {
```

```
            studentArray[i] = new Student();
            System.out.println("Insert " + (i+1) + " student data");

            System.out.print("Insert name :");
            studentArray[i].name = sc.nextLine();
            System.out.print("Insert nim :");
            studentArray[i].nim = sc.nextDouble();
            sc.nextLine();
            System.out.print("Insert gender :");
            studentArray[i].gender = sc.nextLine();
            System.out.print("Insert IPK :");
            studentArray[i].ipk = sc.nextDouble();
            sc.nextLine();
        }

        for (int i = 0; i < 3; i++)
        {
            System.out.println(i + " Student Data");
            System.out.println("name : " + studentArray[i].name);
            System.out.println("nim : " + studentArray[i].nim);
            System.out.println("gender : " + studentArray[i].gender);
            System.out.println("IPK score : " + studentArray[i].ipk);
        }
        System.out.println("Average IPK of all students : " + studentArray[0].averageIPK(studentArray));
    }
}
```

```
Insert 1 student data
Insert name :Rina
Insert nim :1234567
Insert gender :P
Insert IPK :3.5
Insert 2 student data
Insert name :Rio
Insert nim :7654321
Insert gender :L
Insert IPK :4.0
Insert 3 student data
Insert name :Reza
Insert nim :8765398
Insert gender :L
Insert IPK :3.8
0 Student Data
name : Rina
nim : 1234567.0
gender : P
IPK score : 3.5
1 Student Data
name : Rio
nim : 7654321.0
gender : L
IPK score : 4.0
2 Student Data
name : Reza
nim : 8765398.0
gender : L
IPK score : 3.8
Average IPK of all students : 3.766666666666667
```