

# Laboratory work #5 | Classes

## Lab objectives

As a result of this laboratory work you will know how to work with Classes in Java: what is it, how to create classes, declare methods and fields, how to use access modifiers.

Implement a class having described functionality. Demonstrate its behavior.

Each class typically should have number of elements such as: private fields, constructors, methods and accessors. Consider initialization with default or custom values. Methods implementing behavior of the class, accessors (special methods) implementing reading or writing for fields, if required. Exceptions should be used for error handling in corresponding situations. Main program should demonstrate all the mentioned aspects of the class.

## Variants

#	Description
1	Create class, representing triangle with coordinates of its vertices. Methods for translation by offset, rotation by angle and direct changing of vertices coordinates should be presented. Methods computing lengths of the sides of the triangle should be implemented.
2	Create a class, representing complex number with real and imaginary parts as fields of type double. Implement methods computing sum, difference and product of two complex numbers, represented by such class, each method returning new complex number, and method computing modulus of the complex number.
3	Create a class describing vector represented as fields of type double for its components X, Y and Z. Implement methods computing sum of two vectors, difference of two vectors, length of the vector and scalar product of two vectors.
4	Create a class describing 2D-rectangle, considering its sides always parallel to the axes. Implement methods for moving and changing sizes of the rectangle. Implement methods computing intersection rectangle of two rectangles, and method computing smallest containing rectangle of two rectangles.
5	Create a class describing rational number consider it as fraction of two integers $p/q$ represented as two fields. Implement methods computing sum, difference, product and division of two rational numbers. Implement method, returning approximate value of rational number in form of floating-point number of type double.
6	Create a class describing rectangular box with its dimensions, – length, width and depth, – represented as floating point numbers of type double. Implement method computing volume of the box, accessors for reading and changing dimensions, method for checking, if one box fits into another, and checking, if two boxes fits into third together in any way.
7	Create a class describing interval range $[a, b]$ with two fields of type double. Implement methods computing sum, difference, product, division, maximum and minimum of two intervals returning new result interval. Implement method returning median of interval as single floating point number.

## Code examples

### Class declaration

```
public class MyClass {  
  
    private String somePrivateString;  
  
    public MyClass(String message) {  
        //example of initialization of the private field  
        //we can't change this field outside this class  
        somePrivateString = message;  
  
        //default value for the public field  
        //in future user of this class can change it  
        someIntegerField = 42;  
    }  
  
    //getter  
    public String getString() {  
        //accessing to instance field  
        //readonly access to this field for the user  
        return this.somePrivateString;  
    }  
  
    @Override  
    public String toString() {  
        return this.somePrivateString + " " + someIntegerField;  
    }  
}
```

### Class usage

```
public static void main(String[] args) {  
    MyClass mc = new MyClass("Hello!");  
  
    String str = mc.getString();  
  
    System.out.println(mc);  
}
```