Assignment 10 (Bonus)

Exercise 1 (5pt)

Write a Book class that contains the title and author of a book. Implement the BookShelf class that stores a ArrayList of books.

Add a method to sort the books (the sorting should first follow the title then the author), and a method to find a particular book.

Exercise 2 (7pt)

Write the Complex number class. The class must extend java.lang.Number. The conversion to the basic types (e.g., float, double, ...) should be done on the real part.

It should provide

- An empty constructor (initialise the number to 0)
- A constructor with one parameter (real number)
- A constructor with 2 parameters (real and imaginary part)
- re() that returns the real part
- im() that returns the imaginary part
- conjugate() that returns the complex conjugate
- addition, subtraction, and multiplication, with complex numbers or doubles (see https://en.wikipedia.org/wiki/Complex number#Elementary operations)

Exercise 3 (5pt)

Implement the GeometricObject class (or reuse the one from previous assignment), it should provide

- The x, y position
- · An empty constructor that initialises it at 0,0
- · A constructor that takes the 2 fields
- A method getArea() that returns the area
- A method getPerimeter() that returns the perimeter

Implement also 3 subclasses (add all necessary fields and methods)

- Circle
- Rectangle
- Triangle

Implement setters for the radius width/height and base/height for the 3 geometric figures and throw the appropriate exception if the values are invalid (e.g., negative).

Exercise 4 (6pt)

Implement the Triangle class. The constructor should take 3 arguments, corresponding to the length of the sides. In a triangle, the sum of any two sides is grater the the other side. Create the IllegalTriangleException class and make the constructor of the Triangle class throw such exception if the object violates the rule.

Example:

```
new Triangle (10, 1, 1), violates the rule since 1 + 1 < 10
```

Exercise 5 (7pt)

Write a java program that counts the number of characters (with and without spaces), words, and lines in a file. The filename should be passed as a command-line argument.

```
Example of call:
```

Instructions

The solution of the exercises must be provides as a **java** (for the code, do not submit class files), **png** (for eventual screenshot), and **pdf** (for eventual text) files. The **files must be zipped** together before upload.

Assignments not respecting these instructions will be ignored.