Assignment 4

Exercise 1

Draw the UML diagram and implement the class **StopWatch**. The class should contain:

- The `startTime` and `endTime`
- An empty constructor that initialises the start time with the current time
- A method `star` that resets the start time
- A method `stop` that sets the end time
- A method `getElapsedTime` that returns the elapsed time in seconds.

Exercise 2

Draw the UML diagram and implement the class **QuadraticEquation** ($ax^2 + bx + c = 0$). The class should contain:

- A field for each coefficient `a, b, c`
- A constructor that takes the 3 coefficients
- The getters and setters for all fields
- A method `getDiscriminant` that computes the discriminant $b^2 - 4ac$
- A method `hasRealSolution` that checks if the discriminant is positive
- A method `isQuadratic` that checks if a is different from zero
- A method `hasDuplicatedSolution` that checks if the discriminant is zero
- Two methods `getSolution1` and `getSolution2` that returns the two solutions (if any)
  solution1 = (-b+sqrt(discriminant))/(2a) solution2 = (-b-sqrt(discriminant))/(2a)

Exercise 3

Draw the UML diagram and implement the class **RegularPolygon**. The class should contain:

- The number of sides (default 3)
- The length of each side (default 1)
- The x, y coordinates of the centre of the polygon (default 0,0)
- An empty constructor that initialises the fields by default.
- A constructor that initialises the polygon with a given number of sides of a certain length
- A constructor with all fields
- Getters, and setters for all fields
- A method `getPerimeter` that returns the perimeter of the polygon
- A method `getArea` that returns the area of the polygon, the formula is
  $A = (n\_sides\ side\_length^2) / (4\tan(pi/n\_sides))$

Instructions

The solution of the exercises must be provides as a **java** file. The **files must be zipped** together before upload.

Assignments not respecting these instructions will be ignored.