Introduction to Computer Science 2

Lab 1: Objects and Classes

Learning Goals:

- To learn how to use object and classes.
- To learn when to use fields (instance/class) and methods (instance/class)

Exercise 1 (5 points)

Implement a class `Car` with the following properties. A car has a certain fuel efficiency (measured in liters/km) and a certain amount of fuel in the tank. The efficiency is specified in the constructor and the initial fuel level is 0. First, implement an accessor `boolean` method `canDrive` that can decide whether the car can drive a certain distance with the current amount of fuel in the tank. Then, implement a mutator method `drive` that simulates driving the car for a certain distance, reducing the amount of fuel in the tank. In addition, implement an accessor method `getFuel`, returning the current amount of fuel in the fuel tank, and a mutator method `addFuel`, to add fuel to the tank.

Test the methods of the class `Car` in the `main` method for the case when the car has been tanked initially 40 liters of fuel and has to drive fro 400 km.

To simplify automatic grading of your solution please employ the following definitions of the methods of class `Car`:

```
public Car(double efficiency)

public boolean canDrive(double distance)

public void drive(double distance)

public double getFuel()

public void addFuel(double fuel)
```

Exercise 2 (5 points)

In this assignment you will enhance the class `Car` that you implemented for Exercise 1.

Begin with a simple enhancement: add an instance variable to the `Car` class that represents the car motor number. Modify the constructor of the `Car` class so that it assigns the motor number sequentially. This means that the first `Car` object will get motor number 1, the second `Car` object will get motor number 2, and so on. The second enhancement will help car owners to see how many litters of fuel that added each time they were filling the tank. For that purpose you need to modify the fields, constructor, and method `addFuel` in the class `Car`. The modified method `addFuel` in addition to its previous functionality has to create a `String` object that describes the car number and amount of fuel added to the tank. This `String` object has to be added to a global `String` object that contains the descriptions of all the tank fillings so far for all the `Car` objects created. An example of the content of the global `String` object is given below:

```
Car Motor Number 3: 20 liters
Car Motor Number 143: 15 liters
...
Car Motor Number 3: 15 liters
Car Motor Number 2: 45 liters
```

Provide an access method `fuelRefills` for the global `String` object and test this method in the `main` method of the class `Car` when creating 3 – 4 `Car` objects.

Hint: the global `String` object has to be referred by a `static` variable.

To simplify automatic grading of your solution please employ the following definition of method `fuelRefills` of class `Car`:

```
    public static String fuelRefills()
```

Honor code, coding style, and deliverable:

Try to solve the exercises with what you already know. You are welcome to expand your program to do extra things but they are not mandatory.

Plagiarism is not allowed! We will run sophisticated software that automatically detects similarities on source code among students. All plagiarism incidents will be immediately reported to the Board of Examiners!

Submission!

Submit your java files to canvas.
Ask your instructor in case there is a problem with your submission.

DO NOT SEND SUBMISSIONS VIA EMAIL
YOUR LAB WILL NOT GET GRADED!