CSE 271 Lab 3 – Java Class, Equals Method, toString Method, and JavaDoc
Spring 2022
Assigned: 2/10/2022
Due: 2/13/2022

Introduction:

In this lab, we are going to practice creating Java Classes. To do this, create a new Eclipse Java project named **Lab3**. Your task is to design two Java Classes in this lab. You must also include JavaDoc comments for all *methods* and *classes* including parameter and return descriptions. See the comment style in the Week 3 Lecture Code for examples. You will be given a driver class for testing both of your custom classes.

Class DateTime:

Create a class named **DateTime** that has the following private Instance Properties:

- **int second –** The second field of the time ranges from 0 to 59.
- **int minute –** The minute field of the time ranges from 0 to 59.
- **int hour –** The hour field of the time in 24-hour format which ranges from 0 to 23.
- **int day –** The day field of the calendar date ranges from 1 to 31.
- **String month –** The month field of the calendar date, i.e., “January”.
- **int year –** The year field of the calendar date, i.e., 2021

The **DateTime** class should contain the following methods:

- **public boolean equals(Object o) –** Override the default Object class’s equals(). This method should return true if the Object parameter is an instance of DateTime and both the parameter Object and the DateTime object have the same second, minute, hour, day, month, and year, else return false.
- **public String toString() –** Override the default Object class’s toString(). This method should return a String representation of the date and time, i.e., “12:59:43 23 January 2021”. The time format is in *hh:mm:ss*, where h is hour, m is minute, and s is second.
- **A set of getters and setters for all Instance Properties.** Look at the Week 3 Lecture Code for examples.

You are given a **DateTimeDriver** class to test your **DateTime** class. It is contained in the zip file posted in the Lab-3 assignment. Download that, extract the **DateTimeDriver.java** file, place it in your project folder, and test your class. **DO NOT MODIFY THE DateTimeDriver.java CODE!** After testing, you should have the following output:

DateTimeDriver Test Run:

Console:

```
DateTime 1: 12:21:59 25 January 2021
DateTime 2: 12:43:59 25 January 2011
Two DateTime objects are not equal.

DateTime 1: 12:21:59 25 January 2021
DateTime 2: 12:43:59 25 January 2021
Two DateTime objects are not equal.

DateTime 1: 12:43:59 25 January 2021
DateTime 2: 12:43:59 25 January 2021
Two DateTime objects are equal.
```

Class Car:

Create a class named **Car** that has the following private Instance Properties:

- **int yearModel –** The yearModel field is an integer of the car's year.

- **String make –** The make field is a String of the car's make.

- **int numberOfWheels –** The number of wheels the car has.

- **int speed –** The speed Instance Property is an integer that contains the car's current speed in miles per hour (mph). The speed cannot be a negative number. The maximum speed of a car is 200 mph. You must ensure that the speed is within the valid range when a car accelerates or brakes.

- **double fuelLevel –** A double that holds the current fuel level of the car. This value ranges from 0 to 10.0. You must make sure the value is always within this range when you accelerate.

The **Car** class should contain the following methods:

- **public void accelerate() –** This method increments the car's speed by 4 mph and decreases the car's fuelLevel by 0.5. The method does not return anything. Do not accelerate if the car does not have enough fuel (at least 0.5). If the current speed is the maximum (200 mph) then the acceleration will not increase the speed but will decrement the fuel.

- **public void brake() –** This method decrements the car's speed by 3 mph. The method does not return anything. The speed cannot be negative as a result of a brake. If you hit brake if the car's speed is 3 mph or less, then the brake call will reduce the speed to 0 mph.

- **public boolean equals(Object o) –** Override the default Object class equals(). This method should return true if the Object parameter is an instance of Car and both the parameter Object and the Car object have the make, yearModel, numberOfWheels, speed, and fuelLevel, else return false.

- **public String toString() –** Override the default Object class toString(). This method should return a String representation of the car that includes the make, yearModel, numberOfWheels, speed, and fuelLevel of the car. When this method is called, it returns a String in the format “Make: Mustang, Year: 2001, Wheels: 4, Speed: 75, Fuel Level: 7.0”.

- **A set of getters and setters for all Instance Properties.** Look at the Week 3 Lecture Code for examples.

You are given a **CarDriver** class to test your **Car** class. It is contained in the zip file posted in the Lab-3 assignment. Download that, extract the **CarDriver.java** file, place it in your project folder, and test your class. **DO NOT MODIFY THE CarDriver.java CODE!** After testing, you should have the following output:

CarDriver Test Run:

Console:

```
Car 1: Make: null, Year: 0, Wheels: 0, Speed: 0, Fuel Level: 0.0
Car 2: Make: null, Year: 0, Wheels: 0, Speed: 0, Fuel Level: 0.0

Car 1: Make: BMW, Year: 2021, Wheels: 4, Speed: 188, Fuel Level: 2.0
Car 2: Make: Tesla, Year: 2021, Wheels: 4, Speed: 200, Fuel Level: 5.0

After 4 accelerations for car1 and 6 brakes for car 4
Car 1: Make: BMW, Year: 2021, Wheels: 4, Speed: 200, Fuel Level: 0.0
Car 2: Make: Tesla, Year: 2021, Wheels: 4, Speed: 182, Fuel Level: 5.0

Car 3: Make: Google, Year: 2022, Wheels: 4, Speed: 25, Fuel Level: 5.0
Car 4: Make: Apple, Year: 2022, Wheels: 2, Speed: 20, Fuel Level: 5.0

After 12 accelerations for car3 and 12 brakes for car 4
Car 3: Make: Google, Year: 2022, Wheels: 4, Speed: 65, Fuel Level: 0.0
Car 4: Make: Apple, Year: 2022, Wheels: 2, Speed: 0, Fuel Level: 5.0
The cars are not equal

Car 3: Make: Google, Year: 2022, Wheels: 2, Speed: 65, Fuel Level: 0.0
Car 4: Make: Apple, Year: 2022, Wheels: 2, Speed: 0, Fuel Level: 5.0
The cars are not equal

Car 3: Make: Google, Year: 2022, Wheels: 2, Speed: 65, Fuel Level: 0.0
Car 4: Make: Google, Year: 2022, Wheels: 2, Speed: 0, Fuel Level: 5.0
The cars are not equal
```

Submission Instructions:

After you have completed the lab assignment, locate your source code (**Car.java and DateTime.java**) in your workspace and submit it to the corresponding Lab 3 assignment's CODE plugin.

Rubric:

Task	**Grade**
DateTime	
Declare private Instance Properties	5
equals() method with appropriate header	10
toString() method with appropriate header	10
Correct output	10
Car	
Declare private Instance Properties	5
accelerate() method with appropriate header	10
brake() method with appropriate header	10
equals() method with appropriate header	10
toString() method with appropriate header	10
Correct Output	10
Program contained proper JavaDoc and individual comments where needed for both the DateTime and Car classes and followed the Miami University coding guidelines	10
Total	**100**