Homework 5

CST 338

Create three classes `Vehicle`, `Truck`, and `Person`. The `Vehicle` class has a make and model, test emissions per mile, and a driver/owner (= `Person` object). (Each vehicle can only have one driver/owner.) The class `Truck` is a derived class from the `Vehicle` class and has additional properties load capacity in tons (type `double` since it can contain a fractional part) and a towing capacity in pounds (type `int`). Be sure that your classes have appropriate constructors, accessors, mutators, `equals()`, and `toString()` methods. The `equals()`and `toString()` methods should each include an `@Override` annotation.

Defeat Device

It was discovered that certain vehicle manufacturers used software known as *defeat devices* to detect when the vehicles were being tested for emissions and reduced emissions for the tests. In other words, under normal driving conditions, these vehicles might have far higher emissions than reported.[1]

Suppose each vehicle can keep track of emissions over time. Suppose also that after three months, the number of miles and emissions (in grams) are reported. At this point, if the vehicle's emissions per mile exceed .2 grams per mile, the vehicle will be recalled. If the vehicle is a truck, emissions per mile may not exceed .4 grams per mile. If recalled, the vehicles are no longer street legal.

Note: Emissions per mile should be accurate to two decimal places.

Lost License

Certain drivers do not live up to the rules of the road and/or fail or are unable to to renew their license. Your `Person` class should keep track of whether a driver has a license or has lost their license. You may assume that all people start with a license.

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[1] While the scenario depicted in this assignment is simplified/fictional, defeat devices are a real thing. You can read more on the topic at this link.

Demo Program

The following presents a sample test program.

```java
public class Demo {
    public static void main(String[] args) {
        Person p1 = new Person("Jean", "Bartik", true);
        Person p2 = new Person("Leslie", "Lamport", true);
        Person p3 = new Person("Adi", "Shamir", true);
        Person p4 = new Person(p3);

        System.out.printf("Person 1: %s%n", p1);
        System.out.printf("Person 2: %s%n", p2);
        System.out.printf("Person 3: %s%n", p3);

        // vehicles manufactured
        Vehicle v1 = new Vehicle("Benvolio", "Cavaliere",.1);
        Truck t1 = new Truck("Abelard", "Ravageur", .3, 2.3, 12000);
        Vehicle v2 = new Vehicle(v1);

        // vehicles purchased
        v1.setOwner(p1);
        v2.setOwner(p2);
        t1.setOwner(p3);

        // emissions data after 3 months
        v1.checkEmissionsData(1140, 3600);
        v2.checkEmissionsData( 900, 2900);
        t1.checkEmissionsData(1500, 6000);

        // Person 4 lost their license.
        p4.lostLicense();

        // vehicle information after 3 months on the road
        System.out.println(v1);
        System.out.println(v2);
        System.out.println(t1);

        // Does Person 3 still have their license?
        System.out.println(p3);
    }
}
```

Here is the expected output:

```
Person 1: Jean Bartik has a driver's license.
Person 2: Leslie Lamport has a driver's license.
Person 3: Adi Shamir has a driver's license.

The Benvolio Cavaliere, owned by Jean, is not street legal, with emissions
per mile of 0.32.
The Benvolio Cavaliere, owned by Leslie, is not street legal, with emissions
per mile of 0.31.
The Abelard Ravageur, owned by Adi, is street legal, with emissions per mile
of 0.25.

Adi Shamir has a driver's license.
```

Your program will be graded based on

1. Compilation without error.
2. Correct output result.
3. Good programming structure.
4. Comments. (Title, Abstract, Author, and Date are mandatory.)
5. Meaningful and related variable names.

Submit your Java files (`Person.java`, `Vehicle.java`, and `Truck.java`) on iLearn.