ELEC 2543 Object-Oriented Programming and Data Structures

Programming Exercise 2b

Topics: Creating objects, Aliases

Overview: There are two parts in this exercise. In Part 1, you are requested to extend class Fraction that you developed in Lab 2a to include several methods that create new objects. In Part 2, you have to work with object references, aliases, and methods developed in Part I to develop the desired output.

Part I

Please first make sure you have a working version of Fraction.java that produces the expected output from Lab 2b. Then, start a new project in Eclipse. Right click on **src** of your newly created project. Select **New 🡪 Class** on the Menu. **New** is the first item on the Menu.

The **New Java Class** window will show up. In the Name box, type Fraction2. Fraction2.java will be created automatically. Copy the content (data variables and methods) of your working Fraction.java to Fraction2.java. Make sure you rename all constructors for Fraction appropriately.

In class Fraction2, define the following functions:

1. public void square()

This method squares the fraction. The numerator and denominator of the object are permanently changed to the square of the original fraction.

1. public Fraction2 copy()

This method creates a copy of the fraction. That is, a new Fraction2 object is created with the same values as the nominator and the denominator of the calling object. This new object is returned to users. The original object should not be changed. [Hint: you can create new Fraction2 object in a method in the same class.]

1. public Fraction2 inverse()

This method creates a new Fraction2 object that is the inverse of the calling object. The new object is returned to users. The original object should not be changed.

After you have defined your Fraction2 class, run file TestFraction2.java to test whether your implementation is correct. (You have to import TestFraction2.java in the same project, open the file and click the run button.) The correct output is as follows:

f2 is the inverse of f1.....

f1 = -3/4 // Correct answer: -3/4

f2 = -4/3 // Correct answer: -4/3

After squaring f2.....

f1 = -3/4 // Correct answer: -3/4

f2 = 16/9 // Correct answer: 16/9

f1 is now a copy of f2.....

f1 = 16/9 // Correct answer: 16/9

f2 = 16/9 // Correct answer: 16/9

Part II

Download TestAlias.java. Import the file in the same project of Fraction2.java. You have to put in appropriate statements just before the println statements to produce the output below.

Case 1: f1 = 4/9; f2 = 4/9; f3 = 1/3

Case 2: f1 = 4/9; f2 = 1/9; f3 = 1/3

Case 3: f1 = 2/3; f2 = 3/2; f3 = 9/4

In each case, use at most three statements. Each assignment operation is counted as one statement. For example, f1 = f2 = f3; is counted as two statements. You cannot use new statement but you can use the methods you defined in Part I. You should also try to create as few Fraction2 objects as possible.

After you have developed the right output, for each case, starting from the first new statement, explain what objects are created and whether the objects have become a garbage.

Submission: Submit Fraction2.java, TestAlias.java, and a word/text document explaining the object creation of TestAlias.java on or before Feb 9, 2017. We will test your programs using Eclipse.