CSCI 145 -- PA 7

Object-Oriented Design

Feel free to discuss and help each other out but does not imply that you can give away your code or your answers! You cannot work with a lab partner for this assignment. **You must always use the required template (JavaClassTemplate.java from Canvas) and output "Author: Your Name(s)" or "Modified by: Your Name(s)" for each program as applicable**.

New: You can work with a lab partner and each one must submit the same PDF file (include both names in the submission file). Each person must include a brief statement about your contribution to this assignment.

Perform as many exercises from chapter 7 of lab book as possible, but the following lab exercises must be completed. You are not required to turn in written answers to various questions, but it is very helpful in understanding important concepts. You might see those questions on quizzes and exams.

- **Exercise 1** -- Changing People – do not modify Person.java
- **Exercise 2** -- Using the Comparable Interface

  Using Comparable Interface Exercise:
  - Set up a class Compare3 (Compare3.java)
  - Set up one single static method largest with 3 parameters of type Comparable
  - Can create local variable of type Comparable, but do not use any other data types
  - Use compareTo method to compare items
  - Set up a driver that uses Compare3.largest -- can send in 3 items of same type

- **Exercise 3** -- Random Walks (do steps 1 to 7 only)

Exercise 4 – Use **RationalNumber** class (RationalNumber.java) from chapter 7 of the textbook (Canvas textbook source code) to create a tutorial program below.

Write a tutorial program that will provide the user with a fraction arithmetic package by using RationalNumber class from the book. You can assume that the user will enter a valid fraction and the operation is valid as well (notice there is a space before and after / to separate numerator from denominator). The user will get a chance to provide an answer for the problem and get feedback right away. The program must be able to display the number of correct answers and percentage with one digit after the decimal point upon termination (for example, if there are 8 problems and user did 7 problems correctly then it would display "You answered 7 out of 8 questions correctly (87.5%)."). You must follow the format below for the user-interface of your program and you must allow the user to repeat the processing until % is entered as an operator (% is your sentinel value and we always put a space before and after / to separate numerator from denominator; for example, `0 / 1 % 0 / 1`). Here are some examples:

```
[Your Name]'s Rational Tutorial Program

Please follow instructions carefully.
Enter your operation like 1 / 2 + 1 / 4.
You must enter a valid operation.
Enter operator q to stop the program (0 / 1 % 0 / 1).

Please enter your operation --> 1 / 2 + 1 / 4<Enter>
Please enter your result    --> 3 / 4<Enter>
Great job!  It is correct.
1/2 + 1/4 = 3/4

Please enter your operation --> 1 / 2 - 1 / 4<Enter>
Please enter your result    --> 3 / 4<Enter>
It is incorrect:
1/2 - 1/4 != 3/4
The correct answer:
1/2 - 1/4 = 1/4

. . .

Please enter your operation --> 0 / 1 % 0 / 1<Enter>
You have chosen to exit the program
You answered 7 out of 8 problems correctly (87.5%).
```

Try the following cases:

```
 1 / 2  +  1 / 4
 1 / 2  -  1 / 4
 1 / 2  *  1 / 4
 1 / 2  /  1 / 4
-1 / 4  +  1 / 20
 5 / 3  - -1 / 3
 1 / 2  *  0 / 1
 1 / 90 +  2 / 55
 0 / 1  %  0 / 1
```

Question 1: Why must method *changePeople* in *ChangingPeople* class (first exercise) be static? You might want to remove keyword static and try it out.

Question 2: Someone makes a claim that "parameters are always passed by value in Java". Provide arguments for and against this statement (i.e., provide statements to support and statements against it).

Extra Credit: Do step 8 of Random Walks in exercise 3 above (DrunkenWalk.java).

Fill out and turn in the PA submission file for this assignment (save as PDF format).
