Northeastern University
CSYE 6200 – Concepts of Object-Oriented Design
Spring 2023, Prof. Jones Yu

Lab 5 - Assignment 2

Due: 11:59 pm, Saturday, February 18

1. Problem 1

To help you understand wrapper classes, we want you to design your `Integer-like` wrapper class. Please design a class named `MyInteger`. The class contains:

- An `int` data field named `value` that stores the `int` value represented by this object.
- A constructor that creates a `MyInteger` object for the specified `int` value.
- A getter method that returns the `int` value.
- The methods `isEven()`, `isOdd()`, and `isPrime()` that return true if the value in this object is even, odd, or prime, respectively.
- The `static` methods `isEven(int)`, `isOdd(int)`, and `isPrime(int)` that return `true` if the specified value is even, odd, or prime, respectively.
- The `static` methods `isEven(MyInteger)`, `isOdd(MyInteger)`, and `isPrime(MyInteger)` that return `true` if the specified value is even, odd, or prime, respectively.
- The methods `equals(int)` and `equals(MyInteger)` that return `true` if the value in this object is equal to the specified value.
- A `static` method `parseInt(char[])` that converts an array of numeric characters to an `int` value.
- A `static` method `parseInt(String)` that converts a string into an `int` value.

Please write a program to test all methods in the class.

Expected results:

```
n1 is even? false                                    // Set n1 to 7
n1 is prime? true
15 is prime? false                                   // Verify number 15
parseInt(char[]) for { '4', '3', '7', '8' } = 4378
parseInt(String) for "4378" = 4378
n2 is odd? false                                     // Set n2 to 24
45 is odd? true                                      // Verify number 45
n1 is equal to n2? false
n1 is equal to 5? false
```

Note that texts marked with blue colors are the results of method calls. You need to find suitable method calls to output the expected results. As for texts marked with green colors, they remind you what to do to get the expected result on the left side.

2. Problem 2

We want you to create a class `RoomPeople` that can be used to record the number of people in the rooms of a building. The class has the attributes:

- `numberInRoom` - the number of people in a room
- `totalNumber` - the total number of people in all rooms as a `static` variable

The class has the following methods:

- `addOneToRoom` - adds a person to the room and increases the value of `totalNumber`
- `removeOneFromRoom` - removes a person from the room, ensuring that `numberInRoom` does not go below zero, and decreases the value of totalNumber as needed
- `getNumber` - returns the number of people in the room
- `getTotal` - a `static` method that returns the total number of people

Please write a program to test the class `RoomPeople`.

Expected results:

```
Add two to room a and three to room b                     //addOneToRoom()
Room a holds 2
Room b holds 3
Total in all rooms is 5
Remove two from both rooms                                //removeOneFromRoom()
Room a holds 0
Room b holds 1
Total in all rooms is 1
Remove two from room a (should not change the values)     //removeOneFromRoom()
Room a holds 0
Room b holds 1
Total in all rooms is 1
```

Note that texts marked with blue colors are the results of method calls. You need to find suitable method calls to output the expected results. As for texts marked with green colors, they remind you which method to call to perform the action, such as using `addOneToRomm()` for "Add two to room a and three to room b".

3. Submission Requirement:

This is an individual assignment, and each student needs to submit his/her solution to the Canvas. The submission needs to be a .zip file containing following data:

3.1 A document (either .doc or .pdf format) that describes:

- Problem description:
  - A short description of the issue you are solving in your own words, not simply copy and paste to your report.
  - We would recommend you have a deep thinking in the problem. For example, why does this problem matter? How do I transfer my learning from this problem to other problems? etc.
- Analysis:
  - What design/solution/algorithm do you use to solve the problem?
  - What are the difficulties you encounter?
  - Is there any better solution which might not be used in your solution?
  - ...
- Source code:
  - Copy & paste your source code to the report (i.e., all .java files)
  - The codes need to be readable. (Don't make the color too light.)
- Screenshots of sample runs: show that the code has been reasonably tested

3.2 The project with source codes:

- Source project (.zip file): The Eclipse Java project that has all your changes