CS 245 - Practice Assignment 1 Spring, 2020

Practice Assignment 1 - Recursion vs. Iteration

The goal of this assignment is twofold. Firstly, the assignment is the template for all our practice assignments. More importantly, the assignment will give you practice writing basic iterative and recursive functions.

Background

We discussed the factorial function: the input to a factorial function is a positive integer, `n`. The output is the result of the following calculation:

```
output = n × (n-1) × (n-2) × (n-3) × … × 3 × 2 × 1
```

In addition to the function, we discussed two implementations: an iterative version and a recursive version.

We have also discussed the Fibonacci function. For this, the input to a Fibonacci function is a positive integer, `n`. The output is the result of the following decision:

```
output = 0 if n == 0
output = 1 if n == 1
output = fib(n-1) + fib(n-2)
```

This assignment will have you implement two versions — one recursive, one iterative — of these functions.

Requirements (Process)

Requirement 1: Get the file you need. You will copy them to your own GitHub repository using the following procedure:

1. Log into GitHub. If you do not have a GitHub account, create one via github.com > Sign Up.
2. Point your browser to the URL https://classroom.github.com/a/wjgRQj9f.
3. If necessary, authorize GitHub Classroom by selecting the “Authorize github” button as shown in Figure 1.
4. Select your name from the list of names available, which will link your GitHub ID. If you do not see your name on the list, speak with the instructor.
5. Accept the assignment by selecting the appropriate button, as shown in Figure 2.

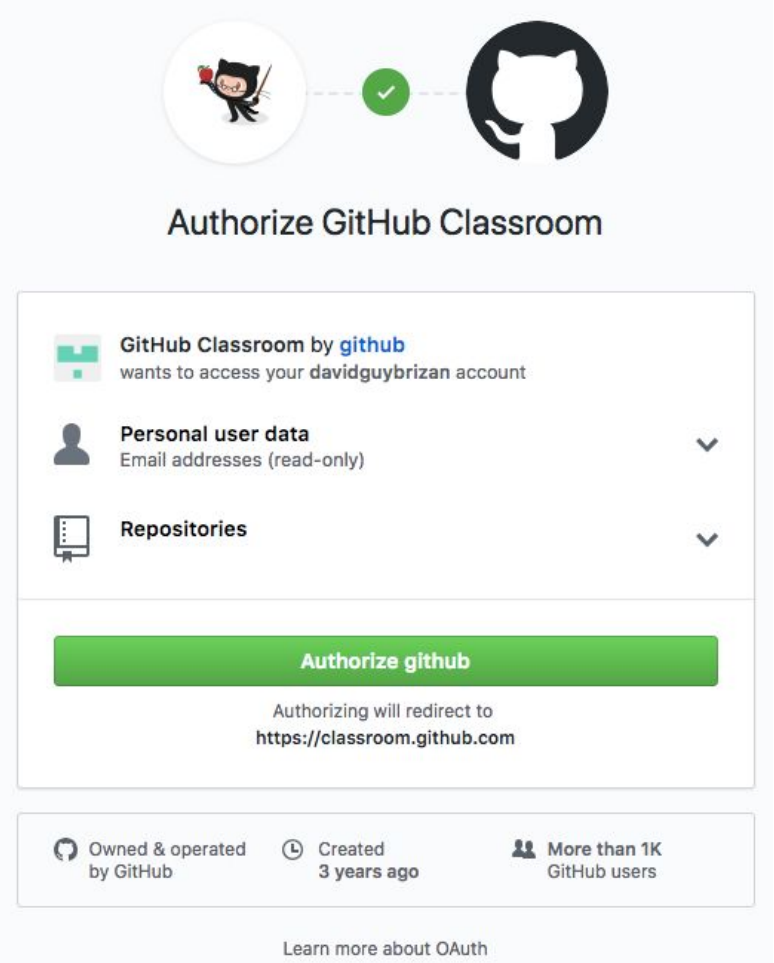

Figure 1: Authorize GitHub Classroom

If successful, your repository should contain one (3) Java files:

- Practice01Test.java — which contains a main function and a few functions to test your code
- Practice01Math.java — an interface which defines the functions you must create
- Practice01Factory.java — which constructs the implementation Practice01Math instances

You are not allowed to make changes to these files.

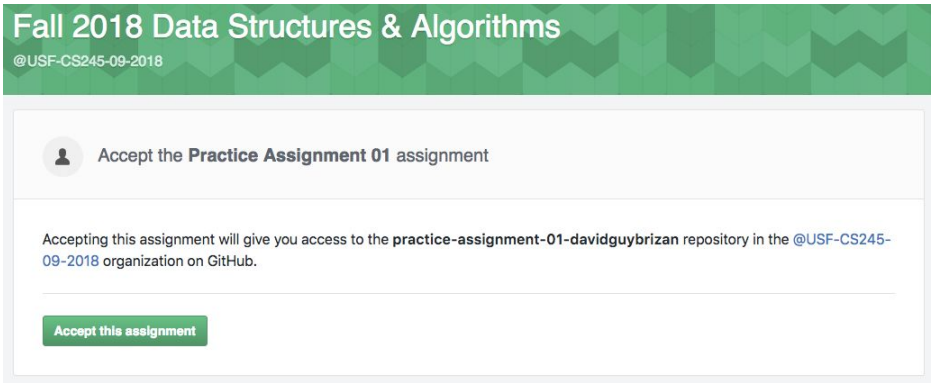

Figure 2: Accept assignment from GitHub Classroom

Requirement 2: Add to the code in order to make it run. Specifically, you must create two classes:

- Practice01MathRecursive.java
- Practice01MathIterative.java

Each of these classes must implement Practice01Math interface. Specifically, each must contain functions with the following header:

```
public int fib (int n)
public int fact (int n)
```

In order to get this working you may use any Integrated Development Environment (IDE) such as Eclipse, Sublime, etc. You may also choose not to use an IDE.

Requirement 3: Test the code by compiling and running Practice01Test. A few values are checked for each implementation. This class checks for those values and determines whether your implementation has successfully reproduced the expected values. When you provide correct implementations, expect to see the following output:

```
Testing correctness.
[+20%] Correct calculations of factorial function.
[+ 5%] Correct calculations of factorial function.
[+20%] Correct calculations of Fibonacci function.
[+ 5%] Correct calculations of Fibonacci function.
[+20%] Correct calculations of factorial function.
[+ 5%] Correct calculations of factorial function.
[+20%] Correct calculations of Fibonacci function.
[+ 5%] Correct calculations of Fibonacci function.
Grade for this assignment: 100%
```

Grading

This assignment is formally graded only on correctness. The assignment generates a grade ("`Grade for this assignment`") based on correctness of the functions, with each of the required classes worth 50% toward your grade. This will be the starting point for the grade for the assignment. Your final grade may be adjusted based on adherence to the above requirements, good style, naming conventions and comments.

See the assignment due date on Canvas. Late assignments receive a 25% penalty per day. Assignments submitted later than 4 days after the due date will receive no credit.

Submission

Use GitHub to check in the code to complete the assignment. Once your implementation is on GitHub, submit the URL for your GitHub repository on Canvas.