Assignment 4

Handout: **Monday, 1 November 2021**
Due: **11:59 am, Wednesday, 10 November 2021**

Goals:

- To understand better the importance of information hiding, inheritance, polymorphism, and dynamic binding;
- To exercise writing generic classes;
- To practice using monitor operations to coordinate the access to shared objects; and
- To get more familiar with the IntelliJ Idea IDE;

Note:

- In this assignment, we are specifying the timeout for the test in BankAccountTest.java using JUnit 5.

1. Calculator Library (25 points)

The calculator library contains classes that are like what you have seen in recent labs. In this task, we will extend the code to also support variables in expressions. Tests in `CalculatorTest` demonstrate how variables are used with expressions, where an `Environment` object keeps track of the values of variables and can be used for evaluating expressions with variables.

What to Do:

[Task 1] Read the existing code and then provide the missing code in package `calculator` so that the classes will pass all the tests in `CalculatorTest.java` and satisfy their requirements as specified in the comments.

2. Generic Set (25 points)

Class `CompSet` implements a `HashSet` as described on page 7 of Lecture07.pdf.

What to Do:

[Task 2] Read and complete the class so that all requirements expressed in both `CompSetTest.java` and the code comments are satisfied. Note that you are not allowed to add new fields to class `CompSet`.

3. BankAccount Using Monitor Operations (20 points)

In this task, you will need to use synchronized methods/statements and operations like `wait`, `notify`, and `notifyAll` to coordinate the `withdraw` and `deposite` operations on a shared bank account.

What to Do:

[Task 3] Complete class `BankAccount` so that the test in `BankAccountTest.java` always executes successfully.

What to Hand in

A ZIP file containing all the files in Assignment-4.