Software Testing

For this exercise, you will do both Black-box and White-box testing of a simple GradeCalculator program. The GradeCalculator program prompts the user to enter an average and then outputs the grade based on that average. The program is intended to work as follows:

Average	Grade
> 100	Invalid
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 – 59	F
< 0	Invalid

However, the GradeCalculator program has a number of "bugs" (software faults/defects) that you will detect through testing. You will then correct and retest the GradeCalculator program until all tests pass.

Project Structure

For this exercise and Projects 3 – 6, you will store your files in a directory structure that is typical of the way projects are organized in higher level courses and real world applications. This structure also facilitates the use of JUnit for the white-box test programs. JUnit is a testing framework for Java programs and requires the use of special Java Archive (jar) files. Follow the instructions below to set up your directory with the correct files:

1. Create a **Day11** directory for your work
2. Create the following **4** directories in your Day11 directory:
   bin, **lib**, **src**, **test**
3. Download **GradeCalculator.java** and place it in the **src** directory.
4. Download **GradeCalculatorTest.java** and place it in the **test** directory.
5. Download **junit-4.12.jar** and **hamcrest-core-1.3.jar** and place them in the **lib** directory.
6. Compile **GradeCalculator.java** and **GradeCalculatorTest.java** as follows - this will place **GradeCalculator.class** and **GradeCalculatorTest.class** in the **bin** directory:

   csc$ javac -d bin src/GradeCalculator.java
   csc$ javac -d bin -cp bin:lib/* test/GradeCalculatorTest.java

Black-box Testing

Add at least **9** tests to the provided Black Box Test Plan:

- In order to access the document, you must be logged into your NCSU Google account
- Open BlackBoxTestPlan_GradeCalculator
- File > Make a copy and save it in My Drive (your Google Drive)
- Rename the file to BlackBoxTestPlan_GradeCalculator
- When you are ready to submit: File > Download as > PDF

Run the **GradeCalculator** program as follows:

csc$ java -cp bin GradeCalculator

for each test case and record the Actual Results for each test.

White-box Testing

Run the white-box test program, **GradeCalculatorTest**, as follows:

csc$ java -cp bin:lib/* org.junit.runner.JUnitCore GradeCalculatorTest

Add the required tests to **GradeCalculatorTest.java**, recompile, and run it.

GradeCalculator Corrections

Correct the errors in the **GradeCalculator** program and repeat the black-box and white-box testing. This an iterative process in which you may make corrections, test, make more corrections, test again, etc. Be sure to update the Actual Results for each black-box test as necessary. When you are all done, the Actual Results should match the Expected Results for each test. Also, all of your white-box tests should pass.

Submission Instructions

Submit the following **3** files:

- **GradeCalculator.java**
- **GradeCalculatorTest.java**
- **BlackBoxTestPlan_GradeCalculator.pdf**

Grading Rubric

1.00 – completed testing and program corrections, good work
0.75 – completed most of the testing and program corrections and/or mediocre work
0.50 – completed some of the testing and program corrections and/or poor work
0.00 – no submission