CST8132 Object Oriented Programming

JUnit testing with JUnit4

What is JUnit?

- A framework used to automate unit testing in the Java programming language
- Implemented as a Java file with test methods
- See the recommended readings and additional resources for more details

General Workflow within each test case (@Test method) inside a Test-Class:

1. Prepare objects and variables **(use meaningful variable names)**
2. Perform one task (typically changing the objects state, getting a return value etc.)
3. Check results for that one task using an appropriate assert method
4. Perform tear-down of resources to prep for next test

What are some commonly used assert methods used with JUnit?

(Taken from http://junit.sourceforge.net/javadoc/org/junit/Assert.html)

assertEquals(double expected, double actual, double delta)
Asserts that two doubles or floats are equal to within a positive delta.
assertEquals(java.lang.String message, double expected, double actual, double delta)
Asserts that two doubles or floats are equal to within a positive delta.

assertEquals(long expected, long actual)
Asserts that two longs are equal.
assertEquals(java.lang.String message, long expected, long actual)
Asserts that two longs are equal.

assertFalse(boolean condition)
Asserts that a condition is false.
assertFalse(java.lang.String message, boolean condition)
Asserts that a condition is false.

assertTrue(boolean condition)
Asserts that a condition is true.
assertTrue(java.lang.String message, boolean condition)
Asserts that a condition is true.

assertNotNull(java.lang.Object object)
Asserts that an object isn't null.
assertNotNull(java.lang.String message, java.lang.Object object)
Asserts that an object isn't null.

What is a tolerance level (delta or epsilon) when comparing double values?

- The smallest difference between the two values at which point they are considered equal (i.e. close enough)
- A rough illustration is given two floats A & B: Math.abs(A - B) <= epsilon as true means A and B are the "Same"
- See this website for much more information on comparing floating point numbers using epsilon values
  Random ASCII. (2012). Comparing Floating Point Numbers, 2012 Edition. Retrieved from https://randomascii.wordpress.com/2012/02/25/comparing-floating-point-numbers-2012-edition/

Suggested Readings

McProgramming. (2014). Java - JUnit testing in Eclipse. [Video] Retrieved from https://www.youtube.com/watch?v=I8XXfgF9GSc
(11 minutes)

Lars Vogel. (2015). Unit Testing with JUnit – Tutorial. Retrieved from http://www.vogella.com/tutorials/JUnit/article.html

Recommended Resources (School Library Videos + Books)

Steps: Visit: http://www.algonquincollege.com/library/
Use the Books & Videos button
Use the Videos & Tutorials tab to access Lynda.com
Use the Ebooks tab to access Safari Books

Lynda.com (Video Courses)

Foundations of Programming: Test-Driven Development with Simon Allardice
(See Chapter 2: Getting Started)

Up and Running with Eclipse with Charles Kelly
(See Chapter 3: Building and Testing Software)

Safari Books: JUnit Testing

JUnit in Action, Second Edition
By: Petar Tahchiev; Felipe Leme; Vincent Massol; Gary Gregory
Publisher: Manning Publications
Pub. Date: July 28, 2010
Print ISBN-10: 1-935182-02-1
Print ISBN-13: 978-1-935182-02-3

Effective Unit Testing: A guide for Java Developers
By: Lasse Koskela
Publisher: Manning Publications
Pub. Date: February 13, 2013
Print ISBN-10: 1-935182-57-9
Print ISBN-13: 978-1-935182-57-3

Java Programming Interviews Exposed
By: Noel Markham
Publisher: Wrox
Pub. Date: February 17, 2014
Print ISBN-13: 978-1-118-72286-2
Web ISBN-10: 1-118722-86-8
eISBN-13: 978-1-118-72288-6
(- This book may help you after graduation (read it before then))
(- See Chapter 9: Testing with JUnit)

Additional Recommended Resources on JUnit (YouTube / Web)

David Whitlock. (2013). Unit testing with JUnit. [Video] Retrieved from https://www.youtube.com/watch?v=k1DE9H8EGNA
(We won't be using HamCrest, or IntelliJ but the code samples and lecture are quite good)
(43 minutes)

McProgramming. (2014). Java - JUnit testing in Eclipse. [Video] Retrieved from
https://www.youtube.com/watch?v=I8XXfgF9GSc
(11 minutes)

JUnit tutorial in Eclipse part 1 : javavids. (2012). [Video] Retrieved from
https://www.youtube.com/watch?v=QEyxgtCEWMw&list=PL0951947FC3CB5BB3
(There are actually 9 videos here, parts 1 through 9)
(Parts 1 through 4 I highly recommend)
(Parts 5 through 9 cover more advanced topics... it looks like 7 and 8 are the same video)

Note: This next video does not use Java and JUnit but the code (C++ it looks like) is similar, and the theory is quite good.

Andrew Fray. (2014). Practical Unit Testing 2014. [Video] Retrieved from
https://www.youtube.com/watch?v=i_oA5ZWLhQc
(Not Java, not JUnit, but theory of unit testing with examples of ant-patterns in testing)
(32 minutes)

Other reference:

junit.sourceforge.net. (n.d.). JUnit API. [Webpage] Retrieved from
http://junit.sourceforge.net/javadoc/

JUnit. (2014). JUnit. Retrieved from
http://junit.org
(lots of learning resources)

Lars Vogel. (2015). Unit Testing with JUnit – Tutorial. Retrieved from
http://www.vogella.com/tutorials/JUnit/article.html