

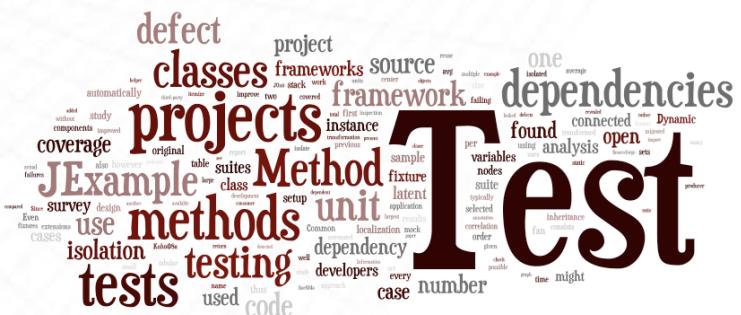


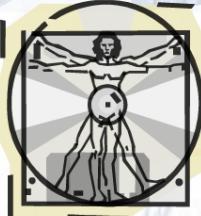
UNIVERSITY OF
CALGARY

SENG 438

Software Testing, Reliability & Quality

Assignment 2

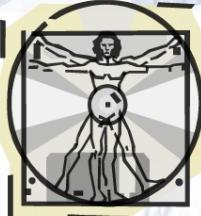




Assignment 2

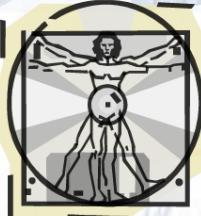
- Requirement-based testing
 - SUT - JFreeChart
 - Requirements
 - Test design
 - Test execution





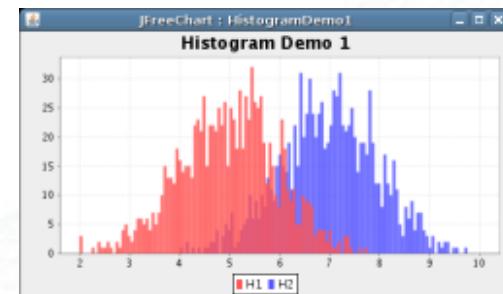
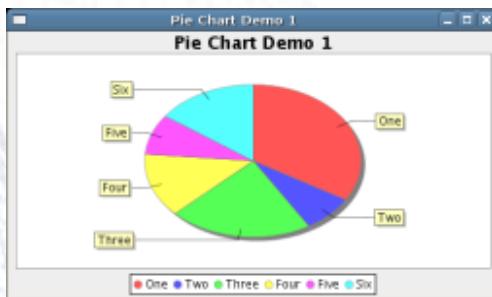
Activities

- **1st week:** Familiarization (setup Eclipse, Junit, mock framework, ensure they work together)
- **1st week:** Writing tests (write test cases and suite for Junit, prepare stubs or mocks)
- **2nd week:** Executing unit test using Junit and demo
- **2nd week:** Reporting the results

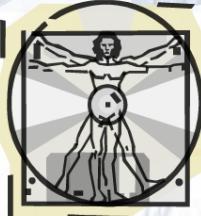


SUT: JFreeChart

- The JFreeChart framework is a free/open-source chart library intended to be integrated into other systems as a quick and simple way to add charting functionality to Java applications

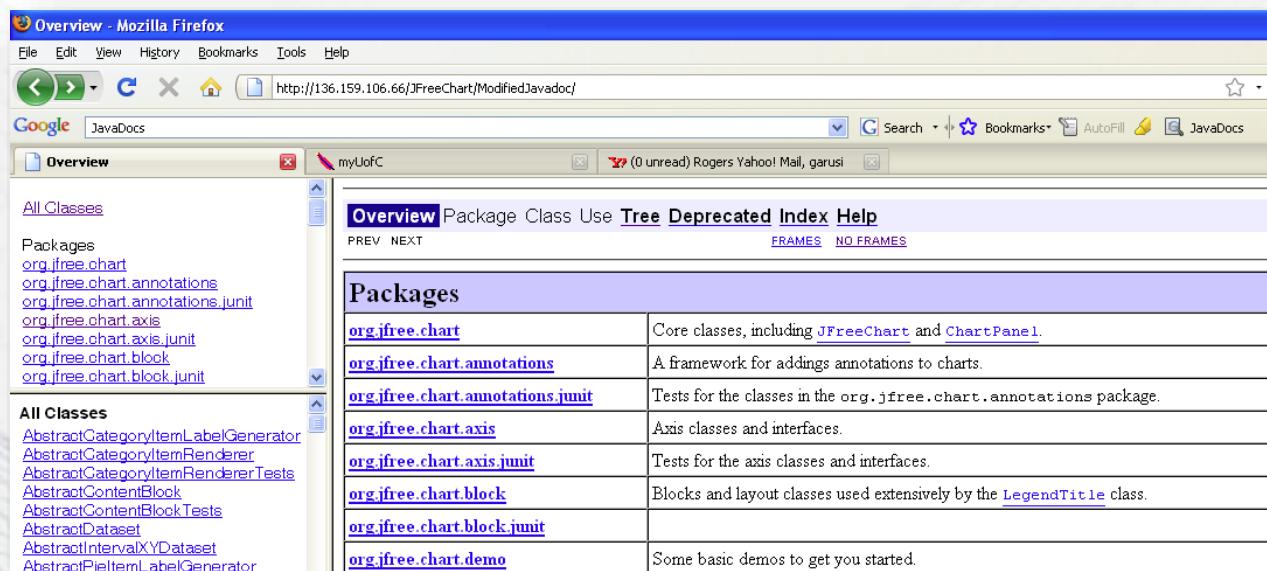


<http://www.jfree.org/jfreechart>



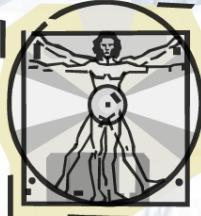
JFreeChart – Requirements

- **Reminder:** SW Requirements can come in many different formats, e.g., plain English, UML models, Javadoc, ...
- In Assignment 2, we will use the Javadoc documentation of JFreeChart as its requirements
 - Online now



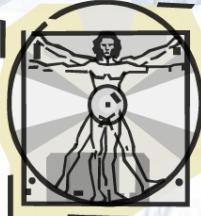
The screenshot shows a Mozilla Firefox browser window displaying the JFreeChart Javadoc documentation. The address bar shows the URL: <http://136.159.106.66/JFreeChart/ModifiedJavadoc/>. The left sidebar contains a navigation tree with sections for 'All Classes' and 'Packages'. The main content area displays a table of packages with their descriptions.

Packages	Description
org.jfree.chart	Core classes, including JFreeChart and ChartPanel .
org.jfree.chart.annotations	A framework for adding annotations to charts.
org.jfree.chart.annotations.junit	Tests for the classes in the org.jfree.chart.annotations package.
org.jfree.chart.axis	Axis classes and interfaces.
org.jfree.chart.axis.junit	Tests for the axis classes and interfaces.
org.jfree.chart.block	Blocks and layout classes used extensively by the LegendTitle class.
org.jfree.chart.block.junit	
org.jfree.chart.demo	Some basic demos to get you started.



Test Requirements

- JFreeChart classes under test
- org.jfree.data.DataUtilities
 - Has 9 methods
- org.jfree.data.Range
 - Has 19 methods
- You have to write tests for 5 methods from each class



Test Design

- Equivalence class testing
- Boundary value analysis
- Robustness testing
- Worst case testing

org.jfree.data Class DataUtilities

java.lang.Object
└ org.jfree.data.DataUtilities

public abstract class DataUtilities
extends java.lang.Object

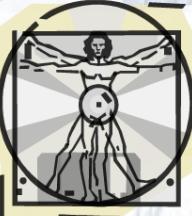
Utility methods for use with some of the data classes (but not the datasets, see [DatasetUtilities](#)).

Constructor Summary

[DataUtilities\(\)](#)

Method Summary

static double	calculateColumnTotal(Values2D data, int column)	Returns the sum of the values in one column of the supplied data table.
static double	calculateRowTotal(Values2D data, int row)	Returns the sum of the values in one row of the supplied data table.
static java.lang.Number[]	createNumberArray(double[] data)	Constructs an array of Number objects from an array of double primitives.
static java.lang.Number[][]	createNumberArray2D(double[][] data)	Constructs an array of arrays of Number objects from a corresponding structure.
static KeyedValues	getCumulativePercentages(KeyedValues data)	Returns a KeyedValues instance that contains the cumulative percentage values.



Test Execution

- Junit 4 or 5
- You need to use **mocking**
 - For “Values2D” and “KeyedValues”
- You are free to choose your mocking framework
- Example of jMock tests for the SUT of the Assignment 2 will be given
 - jMock or any other mocking framework