

# Assignment 2 Comp 1510

## Section 1

Due Sunday, March 2<sup>nd</sup>, 2014, 8:59 pm in the share-in

**Read the entire assignment carefully, especially the sections about assignment preparation and Plagiarism / Collaboration.**

**This is an individual assignment, no partners allowed and no sharing of any code whatsoever.**

There are five programming projects, each is worth 10 marks. The projects can and should be solved using the material in chapters 3 and 4 of the text.

**Project 1:** (package q1) Write an application, called TriangleArea, that reads the lengths of the sides of a triangle from the user. Compute the perimeter and area of the triangle and print the values to three decimal places. The area of the triangle can be calculated using Heron's formula (below), in which  $s$  represents half of the perimeter of the triangle, and  $a$ ,  $b$ , and  $c$  represent the lengths of the three sides:

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

**Project 2:** (package q2) Write an application, called CylinderStats, that reads the radius and height of a cylinder and prints its surface area and volume. Use the following formulas. Print the output to four decimal places. In the formulas,  $r$  represents the radius and  $h$  the height.

$$\text{Surface area: } 2\pi r(r + h)$$

$$\text{Volume: } \pi r^2 h$$

**Project 3:** (package q3) Design and implement a class called Book that contains instance data for the title, author, publisher, and copyright date. Define the Book constructor to accept and initialize this data. Include a no-argument constructor that does nothing. Include setter and getter methods for all instance data. Include a toString method that returns a nicely formatted multi-line description of the book. Create a driver class called Bookshelf, whose main method instantiates and updates several book objects. Bookshelf should create books using both constructors, and exercise all of the methods of Book.

**Project 4:** (package q4) Design and implement a class called Box that contains instance data that represents the height, width, and depth of the box. Also include a boolean variable called full as instance data that represents whether the box is full or not. Define a Box constructor to accept and initialize the height, width, and depth of the box.

Each newly created box is empty (the constructor should initialize `full` to false). Include getter and setter methods for all instance data. Include a `toString` method that returns a one-line description of the box. Create a driver, called `BoxTest`, whose main method instantiates and updates two `Box` objects. `BoxTest` should call each `Box` method at least once and print enough information to indicate that the methods worked correctly.

**Project 5:** (package `q5`) Design and implement an application called `TrafficLight` that draws a traffic light and uses a push button to change the state of the light. Define the drawing surface from the `JPanel` class and use another panel to organize the drawing surface and the button. The traffic light should have green, amber, and red lights and cycle through green -> amber -> red -> green each time the button is pressed.

Each program is required to conform to the style guidelines in **Section 3**. Each class must have Javadoc comments, as in **Section 3**. For this assignment, the Javadoc comments are required for classes, methods and variables but see **Section 3** for details.

For this assignment, programs may consist of multiple classes, with the names as given above. The classes for project 1 should be in package `q1`, project 2 in package `q2`, etc. We will provide an ant script to compile, run, and package your code for submission.

## Section 2

### Assignment Preparation

In the corresponding assignment template zip file, there is a starting project layout for building and packaging your assignment. You will need to fill in your name in the build.xml file. You then need to fill in the code for each of the classes (we give you a template for the main class, you will need to write all of the others) and run the ant script to compile / package your assignment.

In developing each programming project, you will follow the program development steps as discussed in the text book. Specifically, when the problem requires it, you need to perform all of the following steps:

1. establishing the requirements,
2. creating a design,
3. implementing the code, and
4. testing the implementation.

Assignments are to be submitted in *soft copy* (in the sharein). See below for details on the physical requirements for you submission.

## Section 3

### Comments and documentation

**Comment Item:** All Classes (including inner classes)

**Details:**

Do not create comments for the sake of creating comments. Focus is on quality not on quantity. Comments should be succinct and to the point. If you can be brief, then do so. Please use English that is grammatically correct.

Each class must have a Javadoc header block comment immediately before the class statement. This must have the following format:

```
/**
 * Introductory summary sentence describing the class.
 * More complete description of everything the class is supposed
 * to do(may be several lines long.
 *
 * @author name of author of the code and set
 * @version version number, such as 1.0
 */
```

Each paragraph should be separated from the next by a <p> tag. If you need to use lists or tables in the description, you should use HTML tags.

Example header block:

```
/**
```

```

* Graphics is the abstract base class for all graphics contexts
* which allow an application to draw onto components realized on
* various devices or onto off-screen images.
* A Graphics object encapsulates the state information needed
* for the various rendering operations that Java supports. This
* state information includes:
* <ul>
* <li>The Component to draw on
* <li>A translation origin for rendering and clipping coordinates
* <li>The current clip
* <li>The current color
* <li>The current font
* <li>The current logical pixel operation function (XOR or Paint)
* <li>The current XOR alternation color
* (see <a href="#setXORMode">setXORMode</a>)
* </ul>
* <p>
* Coordinates are infinitely thin and lie between the pixels of the
* output device.
* Operations which draw the outline of a figure operate by traversing
* along the infinitely thin path with a pixel-sized pen that hangs
* down and to the right of the anchor point on the path.
* Operations which fill a figure operate by filling the interior
* of the infinitely thin path.
* Operations which render horizontal text render the ascending
* portion of the characters entirely above the baseline coordinate.
* <p>
* All coordinates which appear as arguments to the methods of this
* Graphics object are considered relative to the translation origin
* of this Graphics object prior to the invocation of the method.
* All rendering operations modify only pixels which lie within the
* area bounded by both the current clip of the graphics context
* and the extents of the Component used to create the Graphics object.
*
* @author Sami Shaio, Set K
* @author Arthur van Hoff, Set J
* @version %I%, %G%
*/

```

### What Javadoc tags to use:

```

@author
@link (where applicable) - for example when you want to link to superclasses
@literal (where applicable)
@version
<b> ... </b>
<code> ... </code>
<i> ... </i>
<p> ... </p>
<ul> <li> ... </li> ... </ul>

```

### Comment Item: Class Variable, Instance Variable (including private, protected, public & default)

#### What Javadoc tags to use:

```

@literal (where applicable)
<b> ... </b>
<code> ... </code>
<i> ... </i>
<p> ... </p>

```

<ul> <li> ... </li> ... </ul>

### Details:

The only variables that you will not comment using Javadoc comments are local variables. Local variables can be commented by using the slash-slash style of commenting.

### Comment Item: Method (including private, protected, public & default)

What Javadoc tags to use:

@literal (where applicable)  
@param (where applicable) - when you have parameters passed to a method.  
@return (where applicable) - when you have a return value.  
@see (where applicable)  
@throws (where applicable) - when you have a method that throws an exception - Any exception!  
<b> ... </b>  
<code> ... </code>  
<i> ... </i>  
<p> ... </p>  
<ul> <li> ... </li> ... </ul>

### Details:

Don't forget to comment all methods including constructors.

### Lastly:

Tutorial on javadoc: <http://java.sun.com/j2se/javadoc/writingdoccomments/>

As well, for coding style in Java you are required to conform to the document: <http://java.sun.com/docs/codeconv/html/CodeConvTOC.doc.html>. Note that some of the style items in this document refer to things not yet covered. You can safely ignore these until they become applicable after we have covered the corresponding constructs (loops, for example). We are making the following modifications and additions for assignment 1:

1. Indentation tab spacing is 4 spaces (netBeans default)
2. \* is not allowed in import statements, they must refer to a specific class.
3. Trailing comments (those after source code on a line) should not be used.

Quick checklist for your code conventions:

- proper indenting (4 spaces for each indentation level)
- proper Javadoc documentation (as per above)
- proper variable naming conventions
- one Javadoc comment per variable, class and method
- comments go before the thing commented. .
- only one declaration per line.
- adhere to the 100 column rule <= 100 columns

## Section 4

### Assignment Grading

The grade for this assignment will be assigned on the basis of 10 points for each part.

- up to **2 points** for commenting and following the style guide, and
- up to **8 points** for correctness.

## Section 5

### Schedule

Your project is due on the assigned date at the assigned time. Late assignments will count as zero – *absolutely no exceptions*. It will be your responsibility to ensure that you've submitted the appropriate files and that you've done so on time. Do not wait until an hour before the assignment is due – you never know if you'll have network trouble.

This policy will be waived only for documented medical situations (not including cold, flu, or simply not feeling well) or other extraordinary circumstances (e.g. war, natural disaster). "The computer was down" is not an unusual circumstance; our response will always be "the computer often goes down; you should have allowed yourself more time."

### How to hand in COMP 1510 Assignments

- 1) You must ensure to fill out the `readme.txt` file found in the `src` (source) directory. This file will be bundled up (in your zip file) with your included source code. The `readme.txt` file should contain the status of your assignment. Please fill it out accurately. Note: *You must ensure that your submitted `readme.txt` file accurately reflects what you've submitted in your assignment. If the assignment is not complete but your `readme.txt` file states that it is, you've misrepresented yourself and therefore you will lose marks for this.*
- 2) Ensure that you've checked over the report generated by **Checkstyle**. If it contains errors and you do not fix them, you will lose marks for style (i.e., 0/2). **If you do not understand any of the code conventions, please see your lab instructor well before the assignment is due.**
- 3) Remember, you are only submitting the zip file which contains the source code files and the `readme.txt` file. Although Ant provides this service to you automatically, it is always a good idea to check and ensure that the zip file contains the correct files.
- 4) *Before uploading your zip file please ensure that there are no virus attachments in the zip file. Assignments with viruses will receive a mark of zero. Then upload your file into the **Sharein** in the directory corresponding to your set. This must be before the due date and time.*

## Section 6

### Plagiarism and Collaboration on Programming Projects

The assignment you turn in *must* represent your own work and not the work of anyone else. On the other hand, it is unreasonable to expect that you will work in a complete vacuum, without ever speaking to a classmate. The purpose of this section is to give you guidance about the areas in which it is appropriate to discuss assignment topics with your classmates. Violating these guidelines may result in a charge of academic dishonesty.

#### Plagiarism

The term plagiarism describes an attempt to claim work as your own, which you have copied from another person, whether that other person knows about it or not. In a class like this, plagiarism includes copying program code, data, documentation, etc. Plagiarism is simply not allowed. If you submit another student's work as your own, you will be charged with a violation of the BCIT Academic Integrity Code.

#### Collaboration

Collaboration is defined as two or more students working together on a phase of a project. Working together does not mean that one student does the work and the other student just copies it! Collaboration is allowed under certain conditions, as long as you are honest about it.

You are taking this class to learn important fundamental things about computing, and we must give you a grade that fairly represents what we think you've learned. Therefore, we need to know that your work is your work, so we need to limit the collaboration somewhat. For purposes of projects in this class, here are some guidelines as to which phases of a project are appropriate for collaboration, and which are inappropriate. This may change from assignment to assignment.

OK	Preliminary analysis of problem
OK	Developing an algorithm
OK	Developing a plan for testing
NO	Coding
NO	Proof-reading the program before compiling
OK	Interpreting errors at compilation time
OK	Interpreting errors at execution time
NO	Testing

**Working in pairs**

If the assignment explicitly allows or requires people to work in pairs, then both names must appear on the one assignment, which is handed in for the pair. In this case, the rules on collaboration apply to the students in that pair collaborating with anyone else.

**Save Your Projects!**

You are required to save a copy of all your projects until the end of the semester, after grades have been reported. Be prepared to re-submit these to the instructor if he or she asks you to do so.

**Protect Yourself**

If you suspect that another student is misusing your work (for example, one of your printouts disappeared), report this immediately to the instructor, to protect yourself against a charge of plagiarism if another student copies your work. If there is ever any confusion as to who copied from who, it is institute policy to charge both with plagiarism and punish both (or all) parties.

Read the BCIT Policy on Conduct carefully.