CSC 211 – Introductory Programming and Design

Laboratory Assignment 03:  Rectangles and Circles and Triangles - Oh My!

Tuesday, February 10, 2005

Due date: Tuesday, February 17, at the beginning of the lab.

1 About this Assignment

1.1 Objectives of the assignment

The objective of this assignment is for you to

• use arithmetic operations;
• learn how to implement simple methods to perform numerical computations;
• continue practicing how to debug your code;

Read the text of this assignment very carefully before you begin to type any code. Read the entire assignment once. Do not stop at the first unclear sentence you encounter, it may be explained and detailed a little bit later on. Then go back to the beginning of the assignment. Now is the time to ask questions about something you didn’t understand, code your solution, or move on to the next sentence.

1.2 Handouts

For the third lab assignment your only lab handout is a pdf (Acrobat) file of the present document. There is no source code handout for this assignment.

1.3 Geometric Formulas

You will need the following formulas to complete the lab:

• Distance Formula
  \[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

• Area of a Circle
  \[ A = \pi r^2 \]

• Circumference of a Circle
  \[ C = 2\pi r \]

• Area of a Rectangle
  \[ A = lw \]

• Perimeter of a Rectangle
  \[ P = 2(l + w) \]

• Area of a Triangle
  \[ s = \frac{a + b + c}{2} \]
  \[ A = \sqrt{s(s - a)(s - b)(s - c)} \]
2 What to Do: Perform Geometric Calculations for Rectangles, Circles, and Triangles

2.1 Description of the Program

The purpose of this program is to calculate the area, and perimeter or circumference for a number of circles, triangles, and rectangles. The user will be asked to enter values for three triangles, two circles, and two rectangles. The program will then calculate the area and perimeter or circumference for each shape and display the results.

2.2 User Input

For each shape, you will need to ask the user for a series of $x$ and $y$ coordinates. For the circles, you will need the coordinates of the center of the circle and the coordinates of a point of the outside of the circle. For the rectangles, you will need the coordinates of each of the four corners. For the triangles, you will need the coordinates for the three corners.

Project 1 Create a new project. You will eventually need to use JOptionPane to get the coordinates (integers) from the user, but you may want to start with hard coded values, as we did in last week’s lab. Remember your program will have three triangles, two rectangles, and two circles.

2.3 Perform Calculation

Next you will need to perform calculations to determine the area and perimeter or circumference of each object. You will also need to calculate the length of a line (using the distance formula).

Project 2 Create methods to perform the calculations you will need to complete this program. Make sure to use Java naming conventions.

2.4 Output Results

Now that you have figured out all the values that you need, you need to display the information. For each different shape, you should have a window that displays a particular value for each individual shape. For example, one window will display the areas of both circles, and one window will display the perimeters of all three triangles.

Project 3 Use JOptionPane to display the results according to the specifications given.

2.5 Using Classes

You have finished your program, and it has probably been a tedious experience. Think about how you could use objects and classes in this program.

Report 1 Comment on how you could use classes and objects to implement this program.
3 What to Hand In

3.1 End-of-session evaluation

You are not expected to complete the assignment by the end of the lab session, but you are definitely expected to have done some work during that session. Try to use the lab session to make sure you understand everything about the assignment. Ask questions; try things; ask more questions. You should not leave the lab before your work has been evaluated. This first evaluation is worth 10 pts out of 100 for the complete assignment. If you leave before you have been evaluated, these points are lost with no chance of a later evaluation.

3.2 Your Project

A folder containing your source files and your report. Zip the folder and name the file lastname.firstname.lab03.zip. E-mail the zip file to your TA at nidybansal@gmail.com. Be sure to include the following in the subject of the e-mail:

- The class number, CSC 211
- The section number, Section 02
- The assignment number, Lab 03
- Your name

3.3 Printed Copy of the Report

You should hand in a printed copy of your report at the beginning of the next lab session. If your report is not ready at the beginning of the session, a late penalty (never less than one day, or 10%) will be applied. There is no use typing the report during the lab since the penalty is the same whether you return the report at the end of the lab or the next day at the beginning of the class.

4 How You Will Be Evaluated

4.1 Point Distribution

The maximum number of points is 100, but extra points could be awarded for excellent aspects of the project or report. The point distribution for this assignment is as follows:

<table>
<thead>
<tr>
<th>Execution evaluation</th>
<th></th>
<th>10 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-of-session evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execution of the project handed in</td>
<td></td>
<td>30 pts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source Code</th>
<th></th>
<th>10 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier names</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good indentation and general readability</td>
<td>10 pts</td>
<td></td>
</tr>
<tr>
<td>Judicious comments well positioned in the code</td>
<td>15 pts</td>
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</tbody>
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<thead>
<tr>
<th>Report</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>List of the program’s main variables and their use</td>
<td>5 pts</td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td>10 pts</td>
</tr>
<tr>
<td>General quality of the writing and presentation</td>
<td>10 pts</td>
<td></td>
</tr>
</tbody>
</table>
4.2 Various Point Penalties

Project left accessible on the workstation  
-5 pts

Project folder incomplete or not properly cleaned up  
-5 pts

Report file missing from the project folder  
-5 pts

Late penalties

Printed copy of the report, 1 day late  
-5 pts

Project folder (e-mailed to the TA) per day late  
-10%