

**CECS 220
Spring 2019
Assignment 1
May 21, 2019**

**Due Date: Tuesday, May 28, 2019, 23:59
Total Points: 20**

Please do the following:

1. **(14 points)** Write a Java program that performs calculations related to triangles. A triangle is defined by the (x, y) coordinates of its three corners. The program should prompt a user for the corner point coordinates. Then, the program performs the computations of the following properties of a given triangle:
 - The lengths of all sides
 - The perimeter
 - The area

Finally, the program should produce **all values of a triangle's properties rounded to two decimal places** and display them nicely on the screen.

Use the following formula for calculating the side length between two vertices $A(x_1, y_1)$ and $B(x_2, y_2)$:

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Let X , Y and Z be the lengths of the sides of a triangle, the triangle's perimeter P is calculated as:

$$P = X + Y + Z$$

One method for finding the area of a triangle is the Heron's formula given by:

$$Area = \sqrt{H(H - X)(H - Y)(H - Z)}, \text{ where } H = P/2$$

2. **(6 points)** Write a Java program that reads an 8-bit binary number from the keyboard as a string and then converts it into decimal. For example, if the input is "01001101", the output should be "77". (Hint: Break the string into substrings and then convert each substring to a value for a single bit (i.e., 0 or 1). If the bits from right to left are b_0, b_1, \dots, b_7 ; the decimal equivalent value is $b_0 + 2b_1 + 4b_2 + 8b_3 + 16b_4 + 32b_5 + 64b_6 + 128b_7$.)

Report and Program Submission Guidelines

It is expected that your report to be well written and organized. The report reflects your understanding of the assignment and its solution. So, you must assume that your marks assigned to the report part is related to how is the report is written and presented. All reports must be submitted in PDF format. Each assignment should contain the following:

1. Report

- 1.1. Title page with your name, assignment number and the day you are actually submitting this report (Not the assignment due date).
- 1.2. A brief description of your solution of each problem of the assignment, you can also explain your solution using a pseudocode. *Number your descriptions according to the problem numbers.*
- 1.3. A comprehensive set of snapshots showing the inputs submitted, outputs obtained in the case of a successful output or a failure, including required output formatting, prompts, and messages.

2. Submission Procedure:

- 2.1. Java source files that contain your solutions. They must be a “*.java” files. Source programs should contain meaningful comments and variable names.
- 2.2. Please zip both the PDF document with the source codes and submit one zipped file. Please name your zipped file as “HWx_firstname_lastname.zzz”. Where, “firstname” and “lastname” refer to your first and last names, “x” refers to the homework number (e.g., 1, 2, etc), “zzz” refers to the file name extension for the software used for archiving.
- 2.3. **Submissions after the due date are accepted with a penalty of 25% per day (weekend days are counted as one-day delay).**

Grading Table

Problem	Item		Points
Problem 1	Report (Description of solution)		1
	Output snapshots		1
	Java Source Code Implementation	Style (indentation, comments, and meaningful variable names)	2
		Correct calculation	6
		Input/Output & formatting	4
Problem 2	Report (Description of solution, and pseudocode)		1
	Output snapshots		1
	Java Source Code Implementation	Style (indentation, comments, and meaningful variable names)	1
		Correct calculation	2
		Input/Output	1
	Total		20