CSc 110 Assignment 1
Introduction to Programming

Due May 18, 11:55pm

Due:

- Chapter 1 Exercise #4 (page 54 of text)
- Pi problem (below)

Learning Outcomes:

When you have completed this assignment, you should understand:

- The decimal, binary and hexadecimal number systems.
- How to design, compile, run and check a simple and complete Java program on your own.
- The effect of escape sequences on printed strings.
- The flow of data values (i.e. the effects of assignment statements).
- How to indent and document a Java program.

Problems from the Textbook:

1. Complete the *Chapter 1 Self-Check Problems* and questions 1 through 18 and compare your answer to those given in Appendix A. **Do not hand in.**
2. Compete the *Chapter 1 Exercises* question 4 (on page 54) and submit your code through the Assignment 1 link on the CSc 110 course Connex Site.

Approximating Pi:

The number Pi (π) is the ratio of any circle's circumference to its diameter. Researchers are constantly searching for a more accurate representation of π. In many programming libraries, however, this number is approximated with the following calculation:

$\pi = 4 \times (1 - 1/3 + 1/5 - 1/7 + 1/9 - 1/11 + 1/13 - 1/15 + \ldots)$

(Recall from your pre-requisite math course that . . . means that this series is infinite or goes on forever.)

1. (Hand Calculations – Simplified Problem) Use a calculator and paper/pencil to determine an approximation for π using only the first 7 terms of the sequence above.

$\pi = 4 \times (1 - 1/3 + 1/5 - 1/7 + 1/9 - 1/11 + 1/13 - 1/15) =$ _____

Write down as many decimal points as your calculator provides for you, then re-check your calculation several times.

2. (Program – Simplified Problem) Write a Java program that approximates π using the first 8 terms of the sequence.

   Although this can be done by simply typing the numbers 1 - 1/3 + 1/5 – 1/7 + 1/9 – 1/11 + 1/13 – 1/15 into your editor then multiplying by 4 (and you can try it that way at first), do not move on to step 3 (below) until you have written your program using the following to create this series:

   a. Create a variable called `nextTerm` and assign it (initially) the value `1`.
   b. Create a variable called `denominator` and assign it (initially) the value `1`.
   c. Create a variable called `series` and assign it (initially) the value `0`.
   d. Do the following 8 times:
      i. Add (`nextTerm\denominator`) to the `series`.
      ii. Add 2 to the `denominator`.
      iii. Multiply the `nextTerm` by `-1`.

   Multiply the series by 4 then output the result.

   Sample output of this program:

   `Pi is approximately 3.017071817071818`

HAND IN: Submit your code (i.e., the Java file) for step 2 (above) using the 'Assignments' link of the course web page.