CSc 110 Lab Assignment 1 Part 1
Introduction to Programming

Due:

- Assignment 1 Part 1: Prior to your scheduled lab class during the week of September 20-24, 2010

Learning Outcomes:

When you have completed this assignment, you should understand:

- How to design, compile, run and check a simple and complete Java program on your own.
- The flow of data values (i.e. the effects of assignment statements).
- How to indent and document a Java program.

- How to analyze a problem to identify the input, output and intermediate values needed for computing.
- How to write and call a static method.

Assignment 1 Part 1: 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:

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

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

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

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

   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 7 terms of the sequence above.

Although this can be done by simply typing the numbers 1 - 1/3 + 1/5 – 1/7 + 1/9 – 1/11 + 1/13 into your editor (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 7 times:
        i. Add (`nextTerm\denominator`) to the `series`.
       ii. Add 2 to the `denominator`.
      iii. Multiply the `nextTerm` by `-1`.

> Sample output of this program:
>
> ```
> Pi is
> 3.2837384837384844(approximately)
>
> Press any key to continue . . .
> ```

3. (Complete Program) Write a Java program that approximates π using the first 40 terms of the sequence above.

> Sample output of this program:
>
> ```
> Pi is 3.116596556793833(approximately)
>
> Press any key to continue . . .
> ```

PART 1 HAND IN: Submit your code for step 3 (above) using the 'Assignments' link of the course web page. Your code **must** be submitted before the beginning of your scheduled lab class in the week of September 20-24, 2010.