# CS417 Assignment 1

Due: Wednesday January 29, 2020

Lateness penalties: Thu: 5%, Fri: 10%, Sat/Sun/Mon: 20%, Tue: 50%, Wed: 100%

## Goals

This assignment develops your skills with conditionals, loops, lists, functions, command-line arguments, and file I/O.

## Your Tasks

1. Write a program `is_right.py` which gets three numbers from standard input. It prints `Right` or `Not right`, depending on whether or not the three values are the sides of a right-angle triangle.

   Method: use the pythagorean theorem. If `A` and `B` meet at a right angle, and `C` is the hypotenuse, then

   $A^2 + B^2 = C^2$

   You don't know which numbers are `A`, `B`, and `C`, so you must check all possible combinations. Either `A`, `B`, or `C` may be the hypotenuse, so there are *three* cases to check.

   *Input Details* : You may prompt the user, but your program should expect each number on a separate input line (you need 3 calls to `input()`).

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2. Here is Leibnitz' formula for computing the number π:

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

   If we stop the formula after 5 terms, we get

   $4 \times (1 - 1/3 + 1/5 - 1/7 + 1/9) = 3.3396...$

   (which is a very bad approximation to π!)

   Write a program `pi_approx.py` that gets an an int `n_terms` from standard input (one call to `input()`), computes the approximation to that many terms, and simply prints the result.

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3. Write a program `reduce.py` that takes two numbers from standard input, which are the numerator and denominator of a fraction (`2` calls to `input()`). It then prints the fraction reduced to lowest terms. For example, if the user enters `24`, then `42`, the program should print `4 / 7`.

   Your program should contain a function `gcd(a, b)`, which obtains the greatest common denominator of `a` and `b`, using Euclid's algorithm. The algorithm is on wikipedia (and on the assignment FAQ).

   If the denominator is zero, the program should complain and exit.

   Note that the numerator and denominator may be negative! For example, if the user enters `24`, then `-6`, your program should output `-4 / 1`.

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4. Write a program `diff.py` that takes two file names from the command line. The file names will NOT have spaces in them! It then writes either `files differ` or `files are the same`.

   Example: the user may run your program thus:

   ```
   python diff.py file1.txt file2.txt
   ```

   Method: `open` the files, and read their lines. Then compare their lists of lines.

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5. Write a program `stats.py` that expects *a single command-line argument*, which is a file name. The file name will not contain spaces. The file contains **one value per line**. Read all the values into a list, and compute their minimum, maximum, average, and median.

   *Note*: The values may be `floats`!

   *Note*: To get the median, sort the values first. If there are an odd number of values, the median is middle value. If even, it is the average of the two at the middle.

## Turn in your work

To turn you work in, go to `mycourses.unh.edu`, find CS417 and assignment #1, click the "Submit" button, and upload `is_right.py`, `pi_approx.py`, `reduce.py`, `diff.py`, and `stats.py`.

## Testing

I am supplying starting code, for all five questions. I am also supplying a test program that will run the five programs. Use the test program: we will be using a similar program to grade your work.