

CS417 Assignment 1

Due: Wednesday September 9, 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, file input, and dictionaries.

Your Tasks

1. [10 points] Write a program `q1-is_right.py` which gets three numbers from standard input. It prints `<A> <C> is a Right triangle` or `<A> <C> is Not a right triangle`, depending on whether or not the three values are the sides of a right-angle triangle (print actual numbers in place of `<A>`, ``, and `<C>`. For example, `4.0 2.0 7.0 is Not a right 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()`).

2. [10 points] Here is Leibnitz' formula for computing the number π :

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

If we stop the formula after 5 terms, we get

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

(which is a very bad approximation to π !)

Write a program `q2-pi_approx.py` that gets 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. [10 points] Write a program **q3-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.

4. [10 points] Write a program **q4-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 `<file1>` and `<file2>` differ or files `<file1>` and `<file2>` are the same.

Example: the user may run your program thus:

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

which might output

```
files file1.txt and file2.txt are the same
```

or

```
files file1.txt and file2.txt differ
```

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

5. [50 points] Write a program **q5-grades.py** that expects a *single* command-line argument, which is a file name. The file name will not contain spaces. Each line in the file has three fields, separated by *commas*:
- course name
 - student login
 - score (an int)

Your program should open and read the file's contents, and compute each student's grade-point average.

Output: print one line per student, with three values, separated by *commas*:

- student login
- student's average score
- student's GPA

Use this scale to convert a score into grade points:

Score	≥94	≥90	≥87	≥84	≥80	≥77	≥74	≥70	≥67	≥64	≥60	<60
Points	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0

Turn in your work

To turn your work in, go to mycourses.unh.edu, find CS417 and the assignment, click the “Submit” button, and upload your files:

- `q1-is_right.py`,
- `q2-pi_approx.py`,
- `q3-reduce.py`,
- `q4-diff.py`, and
- `q5-grades.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.