CISC106 Spring 2013 Lab05$\frac{1}{2}$

- This lab an all subsequent labs will be due Thursday at 11:55 PM EDT on Sakai.

- The preparation problems below are to develop your understanding without creating extra work for you or the TA; these problems will not be graded. Be sure to read and understand them - they will help with the problems you must submit for grading

- Review the code examples from your notes in class.

- You may (should, even) work in pairs on your lab. If you do, **one** of you should be designated to submit the assignment on Sakai. **Both of your names** should appear on code that you develop together[1].

- Whom do you think deducts more points: a happy TA, or a frustrated TA? Make your work easy to read! It isn't just good software engineering, it is good for your grade!

- EVERY python program/function must include header, doc string that contains a human-readable desciption of what the function does, and must be followed by a good series of tests, as discussed in class. Always test boundaries. Do not test erroneous input (e.g. a factorial function does not need to correctly handle strings).

- EVERY .py file must have a comment line at the very top containing your name(s), lab section, and a brief description of what the file is.

- Write the tests first! Real software engineers do this for very good reasons - so should you!

- You should add the tests and code for this lab in your lab05_tests.py and lab05.py, respectively.

Preparation (do not submit for grading)

1. Last week in lecture, I said that ranges were the first collection we'd seen to date. I was forgetting that we've seen another type of collection - strings can be treated as a collection of characters![2]

   Write the following function and then copy and paste it into the Python shell:

   ```python
   def verticalize(some_string):
       for char in some_string:
           print(char)
   ```

   After you copy it in, try calling it on a string or two:

   ```python
   >>> verticalize('bluh')
   ```

   Note what happens.

---

[1] If you would like to work with someone but don't know whom, your TA may be able to help connect you to other students looking for lab partners.

[2] Of course, since characters are strings in Python, this means that each character is a collection of just itself.

Problems (to be graded)

1. The following problem comes from http://projecteuler.net/, perhaps it's best to quote from them:

   > The sum of the squares of the first ten natural numbers is,
   >
   > $$1^2 + 2^2 + \ldots + 10^2 = 385 \tag{1}$$
   >
   > The square of the sum of the first ten natural numbers is,
   >
   > $$(1 + 2 + \ldots + 10)^2 = 55^2 = 3025 \tag{2}$$
   >
   > Hence the difference between the sum of the squares of the first ten natural numbers and the square of the sum is $3025 - 385 = 2640$.

   Write a function called `sum_square_difference` which takes a number n and returns the difference between the sum of the squares of the first n natural numbers and the square of their sum.

2. Write a function which takes a string and returns whether or not that string is a palindrome. A palindrome is a string who's reverse is the same as it. Some example palindromes are `'dad'`, `'bob'`, `'madam'`, and `'racecar'`. Your function should return `True` on strings which are palindromes if spaces aren't considered (so it should say that `'a man a plan a canal panama'` or `'was it eliots toilet i saw'` are palindromes), but it need not consider variations in capitalization or punctuation (so it may return `False` on `'A man, a plan, a canal - Panama!'` and `'Was it Eliot's toilet I saw?'`).

You should submit your lab05.py, lab05_tests.py, and any other docs required by your TA on Sakai.