More About Iteration

Learning Objectives

Upon completion of this lab, the student shall be able to:

- Explain the key concepts covered in the Eighth chapter *More About Iteration*.
- Use the Python Interactive Shell and the IDLE editor to enter and execute Python code that defines and uses functions.

Evaluation

Your Python solution shall be evaluated and graded. The instructor will be looking at the following:

- Does the code adhere to separation of concerns, design for reuse, and design only what is needed?
- Does each function, with the exception of `main()`, have comments (i.e., purpose, assumptions, inputs, and post-conditions)?
- Does the code produce the correct results?
- Does the list of test cases address the testing guidelines?

Description

Follow the steps below to complete this lab.

1. Create one Python source code file that contains functions that do the following.

    a. Create a `main()` function that will call the functions to perform the processing described in steps 1.b through 1.d.

    Ask the user for how many numbers they intend to enter. If the value entered is less than one, display an appropriate error message. If the value entered is valid, use iteration (i.e., looping) to obtain that many numeric values from the user. These numeric values may be any value. After obtaining the correct number of numeric values from the user, compute and display the average of these numbers.

    For example, the user may indicate that they will enter 5 numbers. The user is prompted to enter each number, resulting in -10, 5.5, 100, -1.1, and 13 being entered. Your program would then display 21.48 as the average.

    b. Compute and display the nth number in the Fibonacci sequence. You ***must use a for loop*** in this solution. The Fibonacci sequence is explained below.

    c. Computer and display the nth number in the Fibonacci sequence. You ***must use a while loop*** in this solution. The Fibonacci sequence is explained below.

    Explanation of the Fibonacci Sequence
    The next number in the Fibonacci sequence is computed by adding the two previous numbers. For example, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, …. Mathematically, we define the Fibonacci sequence as follows:

    $F_1 = 1$ *first number in sequence is 1.*
    $F_2 = 1$ *second number in sequence is 1.*

$F_n = F_{n-1} + F_{n-2}$ for n>2 *next number in sequence is sum of two previous numbers.*

d. List your black box and white box test cases for problems 1.c and 1.d. List these as comments at the bottom of your Python source code file.

2. Use Canvas to submit your one Python source code file for this assignment.
   a. Be sure you have completed steps **a through e** as described above.