

Computer Science 220
Spring 2012
Program 1

Due: Tuesday, September 4, 2012 at 10:50 AM

Learning objectives:

- Create a Python program on your own.
- Develop a simple Python program that asks for input, does arithmetic, and provides output.
- Practice definite loops
- Apply the Software Development Process (SDP).

Assignment:

Applying the SDP listed below will make implementing your solution easier. BEFORE implementing a solution in Python (step 4), you must perform the first three steps of the SDP (analyze the problem, determine specifications, and create a design). The questions listed in steps 1-3 are intended to help you think about these three steps. Ask yourself these three questions in order and write the answers **in English as comments at the top of your program** (in part, your grade depends on these answers).

Also as part of the SDP, you should **test** your program. A program should reliably produce correct answers and never “crash”. **In your comments, describe how you tested your program** (in part, your grade depends on this answer). Did you consider what inputs might produce incorrect results or might make your program crash? Did you check simple examples? Did you verify your results by hand? For this lab, we won't “catch” problematic input errors (we need selection statements to do this), but I do want you to think about these issues and document (write down) what you think would/could go wrong.

1. What will the program do? (a few sentences)
2. What are the inputs and outputs?
3. What are the detailed steps the program should make to solve the problem?
(This is called the **algorithm**)
4. Implement your code.
5. Test your program.
6. Maintain.

Programming problem:

The average of a set of numbers is often used in calculations. We have seen during lecture how to calculate the most basic of means. For this assignment, you are to write a Python a program designed to output the RMS (root-mean-square) Average and the Harmonic Mean. These represent two different methods for calculating a mean of a set of numbers.

The average of a set of numbers, as discussed during lecture, is given by the formula:

$$mean = \frac{\sum_{i=1}^n x_i}{n}$$

The RMS average of a series of numbers is the square root of the arithmetic mean of the squares of the numbers and is used in science, engineering, and business. It is given by the formula:

$$rms_average = \sqrt{\frac{\sum_{i=1}^n x_i^2}{n}}$$

The harmonic mean is often used when ratios are involved. It is given by the formula:

$$harmonic_mean = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}}$$

Your code should allow the user to specify the number of values to be entered. As a testing example, the values 10, 5, 2, and 5 have a RMS average = 6.205 and a harmonic mean = 4.0.

File to be submitted:

Save your program as **means.py**

Submission instructions:

Log on to OAKS. Click on the link to the dropbox for our class. Upload your files into the folder for Prog1. **Be sure to press the submit button.**

Policies:

The policies given on OAKS are in effect for this and all assignments.