Problem I.2

Calculator

Due Date: 2/1/2019
Folder: `IntroToProgramming`
File Name: `Calculator_LastName.py`

Learning Objectives

- Programming Skills
  − Arithmetic operations
  − Variables
- Using input variables
- Equal sign with programming not usual
- Testing code with different inputs

Problem Background

Variables are the boxes that are used to store information in a program. Usually this information is a number, but it could also be text, a list of numbers, or a completely different object. We take this information and put it in a box labeled with a name.

The concept of variables differs from that in mathematics because we can change the contents of the box, and often do. In math, the variable x stands for a certain value, we just don't know what it is so we call it x. In code however, x is simply a storage device for any information, and that information can be changed during the code.

The main place this is seen is with the equal sign. In math the statement $x = 2$ means that the variable x is the same as the number 2. In code, the statement `x=2` should really be written $x \leftarrow 2$, because what we are doing is storing the number 2 in the box labeled `x`. This allows us to write `x = x + 2` and have it still make sense. We are taking the number stored in `x` adding 2, then storing that result back in `x`.

We often want a box with multiple compartments, so we don't have to come up with a name for all the information, since it is related. For this we use lists. These give one name to a set of objects that we want to store together. These will be very useful when we start using loops.

One main difference between mathematical programming and other programming is that we rarely write code for other users, mostly it is just for ourselves to test an idea. Therefore, we usually don't need to ask the user for input. Asking the user for input slows down testing and is not needed when we have access to the code. Instead, we can use **input variables**. These are variables defined at the beginning of the program that are used throughout the program. They are usually parameters that change small portions of your program, but not the main computation. If you want to change one of these parameters, as the programmer you can simply change the variable value in code. We will be using input variables often during this course.

Programming Reminders

- Most arithmetic operations are the same as with math, with the exception of exponentiation, which uses `**`, i.e. `x**2`.

- To find the remainder after division (the mod operation) use `%`, i.e. `5 % 2` which returns 1.

- Create an empty list with `mylist = []`.

- Append a new element to a list with `mylist.append(2)`.

Program Criteria

Write a program that does the following:

- Has three input variables labeled `x,y` and `z`

- Create a list with 5 components, where each component stores:

  First: `x` plus `y`

  Second: `y` times `z` plus 3 times `x`

Third: The first component squared

Fourth: The ratio of (2 times the second component minus half of `x`) and the first component

Fifth: The remainder when you divide 7 by 3

- Next, add 3 to the third component and store the result in the third component of the list

- Next, multiply the last component by $\frac{3}{4}$ and store the result in the last component.

- Finally, with an appropriate text message, print out the sum of all components in the list.

Deliverables

Place the following in a folder named `IntroToProgramming` in your repository:

- A Python file `Calculator_LastName.py` that satisfies the program criteria.