Programming Exercise 9.4

Round-off Error

Purpose. Learn about the concept of "round-off error" in computer calculations, by writing a program that deliberately causes round-off error.

Requirements. Write a program to demonstrate the phenomenon of round-off error. Name the program **`roundOffError.py`**. Use the loop in chapter 9's section 9.2.1, shown in a box named "More Round-off Error". Your program should get itself caught in an endless loop.

The loop starts a floating-point value at zero, and adds 0.1 to it in a loop, until it reaches 1.0. But when the loop compares the value to 1, where it should end, the total of 10 0.1's is not *exactly* 1! It's real close, but it's not exactly one.

But your job is *not* to verify that this loop fails to exit at 1. Your job is to find some other combination that also does not work! The loop in chapter 9 proves that ten 0.1's do not sum to one *exactly*. Your loop should prove something similar for values *other than* 10 cycles, steps of 0.1, and a sum of 1.

You may have to experiment to find a combination that reveals round-off error. It's okay to start your sum at zero, but use a step other than 0.1, and compare to a sum other than 1.

But make sure that the cause of your loop is round-off error and not math error! For example, don't start at zero, add steps of 0.3, and test for the sum to be 2.0 -- because the sum will go to 1.8 and step over 2 to 2.1!

Program I/O. Input: none. Output: Output is to the console screen, in an endless list. The user must enter Ctrl-C (or control-c) to stop the output.