# Lab: Syntax Rules, Conditions and Loops

Set 3 - Loops

**Note:** Parts of this lab are adapted from S. Linge and H. P. Langtangen (2020). Licensed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/deed.en) (https://creativecommons.org/licenses/by/4.0/deed.en).

## Background

Syntax refers to the rules that define the structure of a programming language, including the structure of its symbols, punctuation and words. Without syntax, it would be impossible for programmers to understand one another’s code and programs.

## Instructions

Use Python IDE to create a solution for the scenario presented in each question.

#### Average of integers

Write a program that gets an integer greater than **1** from the user and computes the average of all integers from 1 up and including that number. Print the result formatted like the sample run below. No need to test for invalid integers.

**Sample run:** (inputs in bold underline)  
Enter an integer > 1: **22**

The average of the integers 1...22 is 11.5

#### A while loop with errors

Assume a program has been written for the task of adding all integers I = 1, 2, ...10:

Some\_number = 0

i = 1

While i < 11

Some\_number += 1

Print some\_number

1. Identify the errors in the program by only reading the code.
2. Write a new version of the program with the errors corrected. Run this program and confirm that it gives the correct output.

**Sample run:**55

#### Simple calculator with menu

Modify the simple calculator program that you wrote for Unit 2 Lab 2. The new version should reprint the menu and ask for another menu selection until the menu selection 0 is entered.

**Sample run:** (inputs in bold underline)  
Run your program 1 time to produce the following output

Simple Calculator  
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **1**  
Enter first number: **5.1**  
Enter second number: **1.7**  
5.1 + 1.7 = 6.8

Simple Calculator   
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **2**  
Enter first number: **5.1**  
Enter second number: **1.7**  
5.1 - 1.7 = 3.3999999999999995

Simple Calculator   
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **3**  
Enter first number: **5.1**  
Enter second number: **1.7**  
5.1 \* 1.7 = 8.67

Simple Calculator   
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **4**  
Enter first number: **5.1**  
Enter second number: **1.7**  
5.1 / 1.7 = 3.0

Simple Calculator  
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **4**  
Enter first number: **10**  
Enter second number: **0**  
Cannot divide by 0  
  
Simple Calculator  
1. Add  
2. Subtract  
3. Multiply  
4. Divide  
0. Exit  
  
Enter menu option: **0**Calculator app closed

Simple Calculator

# Reference

Linge, S. and Langtangen, H. P. (2020). Programming for computations – Python: A gentle introduction to numerical simulations with Python 3.6. (2nd ed.). Springer Open. ([CC BY-SA 4.0](https://creativecommons.org/licenses/by/4.0/deed.en)). Retrieved from https://library.oapen.org/viewer/web/viewer.html?file=/bitstream/handle/20.500.12657/23103/1007055.pdf