# 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.

Lab questions are designed to assess your comprehension of the course materials covered in this unit, therefore questions should be solved using **only** the information provided in the course materials to the end of Unit 2-3. Use of materials outside of this will result in 0 on the lab question.

#### Average of integers using for loop

Write a program that gets a positive integer (i.e. a value **> 1)** from the user and, using a **for** loop with **range()**, iterates through all integers from 1 up and including that number to add each one to a total variable. Lastly, the program then computes and prints the average 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 above program by only reading the code. Create a .txt file listing these errors.
2. Correct the errors in the code and run this program to confirm that it gives the correct output.

**Sample run:**55

#### Simple calculator with menu

Modify the simple calculator program that you wrote for the 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 one 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

**Submission**

For each question, submit your Python source code (.py file) and your test results (.txt file containing output from the Terminal Window after running your Python program) to the Brightspace submission folder for this lab assignment.  
  
For Question 2, you will also need to submit an additional .txt file with a list of all the errors found in the code before you corrected it.

# 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