

# CS 111 – Introduction to Computer Science – Fall 2017

## Lab Assignment #1

### *Introduction to Python\** (20pts)

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**Due Date:** at 11:59pm on Saturday, February 17.

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The first lab in a programming course is commonly used to introduce you to the programming environment that you will be using throughout the term and to the basics of the programming language. For this lab, you are going to practice using the *Wing* Integrated Development Environment (IDE) to create and execute Python programs. In addition, you will debug an existing Python program, modify an existing program to perform a new task, and complete a program that performs several mathematical operations.

Before getting started with the lab, you need to create a folder in your home directory that you can use for this lab throughout the term.



At the top level of your home directory (the U: drive), create a folder named U:\cs111.

Next, you will need several existing text files for this assignment.



Copy the entire lab1 folder from the course folder (H:\CompSci\givens\cs111) to your U:\cs111 folder.

You should now have a subfolder named lab1 within your U:\cs111 folder that contains several Python source files.



#### **Note**

To access the H: folder on your own machine, you must be connected to the RMC network and follow the instructions at this link: [ITS Access and Storage](#).

## The Wing IDE

A Python program is simply a text file containing the program instructions or source code. This text file can be created using any text editor or a programming development environment designed for Python. In this course, however, you will be using the *Wing* IDE to create, edit and execute your Python programs. The IDE includes both the text editor and the Python shell along with helpful options for constructing your programs.

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\*Based on the labs of Dr. Rance Necaise



Start the *Wing* IDE from the start menu.

To practice using *Wing* you are going to work with the `avggrade.py` program.



Using *Wing*, open the `avgGrade.py` from your `U:\cs111\lab1` folder.



After loading the source file into *Wing*,

- Run the program and verify the output is correct. Find the output in the *Python Shell* at the bottom of the application window.
- Change the file prolog (the comment at the top of the file) and add your name and today's date next to the `modified by:` and `date` labels, respectively.
- Change the grades for the three exams to any grade ( $\leq 100$ ) of your choosing and run the program again. Verify the results are correct.

After verifying the results are correct, be sure your source file has been saved.



## Finding and Correcting Errors

It is very common to make mistakes while writing a program, especially by introducing syntax or run-time errors. To get started



Load the Python program `lineSlope.py` into *Wing* and add your name and date to the file prolog comment.



This program is supposed to compute the slope of a line (given two end points) and produce the following output using the formula  $m = \frac{y_1 - y_2}{x_1 - x_2}$

```
Starting point: ( 5 , 12 )
Ending point: ( 30 , 17 )
Slope of the line = 0.2
```

The `lineSlope.py` program contains four syntax errors and a run-time (logic) error. If a program contains a syntax error, the compiler can not translate the source file into byte code.

You are to debug the program, that is, to find and correct the errors, so it will execute and produce the correct results.



## Your First Program

The final part of this lab assignment deals with the construction of a program using simple mathematical expressions. You will be given the beginning part of a program that you must complete to solve a given problem.



Load the `cylinder.py` source file from your `lab1` folder and add your name and date to the file prolog.



The `cylinder.py` program is supposed to compute and display the volume, surface area, and circumference of a cylinder given its height and radius. The formulas for computing these values are provided below.

$$\begin{aligned}C &= 2\pi r \\A &= 2\pi r h \\V &= \pi r^2 h\end{aligned}$$

After computing the various values for the cylinder, the results should be displayed to the terminal in the following format:

```
Cylinder dimensions:
height = 12 radius = 1.5
  area      = 113.09733360000001
  volume    = 84.8230002
  circumference = 9.424777800000001
```



### Note

There are no blank spaces in the output to the left of the `C` in cylinder. In addition, the output of your program should look exactly as that shown above, other than the data values themselves.

- Complete the program by adding the necessary instructions to compute the results, store each result in a variable, and print the results in the prescribed format.
- After completing your program, you should fully test it by assigning various values for the radius and height of the cylinder and verifying the results are correct.
- When testing, use at least two sets of values for the radius and height. Add a comment following the assignment statements that indicates the values that were used for testing.

After verifying the results, be sure your source file has been saved.



## Finishing Up

When you are finished with the lab, you need to show me that your code runs and correctly computes the solution for each part of the lab. Also, you need to submit the source files for grading. To submit the files, find the lab assignment on Canvas and upload the three files:

- `avgGrade.py`
- `lineSlope.py`
- `cylinder.py`