

ENGR 102 – Spring 2021
Sections 501 and 502
Dr. Fullerton
Lab Assignment #11b

Deliverables:

There are several deliverables for this individual assignment, however they can all be organized into one file. Organize your file such that all function definitions are near the top following any `import` statements. Then write main code underneath to test each of the functions. Please comment your code so that we can follow what you are doing. Please submit the file to the Submission Box labeled “Lab Assignment 11b Individual Activities”. The file should be named as listed below:

- `Lab11b_Act1.py` program file with all function definitions and main code for testing

Your file should be structured as follows:

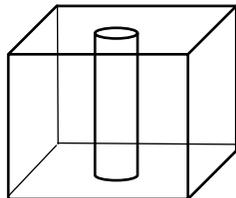
- Header information at the top.
- `import` statements under the header.
- Function definitions under the `import` statements.
- Main code which tests each function below the function definitions
 - Please include comments so that we may easily find the various parts of your code.

Please refer to the posted document [“Commentary on Lab 11b.pdf”](#) for additional information.

Activity #1: Programs to test writing functions – to be done individually.

This activity is meant to give you more experience writing functions.

- a) Imagine that you have a block of material in which a hole has been drilled:



Write a function that will take as parameters the following four dimensions of the box: 1) length, 2) width, and 3) height, and 4) the radius of the hole. Your function should calculate and return the volume of material remaining. Assume the hole has been drilled along the height direction. Also assume that the hole is drilled in the center of the face. Note: Check that the specified radius is less than $\min(\text{length}/2, \text{width}/2)$. If it is not, your function should return an error message of some sort. You may assume that the units among the input parameters are consistent.

- b) Imagine that you have three parallel lists of the same length, one with the names of several production facilities, another with the annual cost to operate each of those facilities, and a third with the value of the products produced at each facility. Write a function that takes as parameters the three lists described above and returns both the name and net profitability

(profitability is the value of what is produced minus the cost to operate) of the least profitable facility.

- c) Write a function that takes as parameters a person's name, city, state, zip code, and address, where the address is either one string (one line) or two strings (two lines) and prints the person's information like a mailing label. Show that the routine works regardless of whether it is called with one address line or two address lines.
- d) Write a single function that takes a Python list of floating-point numbers as an input parameter and returns the minimum and maximum values from the list along with the mean value of the list elements. (Note: We have written this code before, just not as a function. It's okay to reuse the existing code. Simply create a function definition around the existing code.)
- e) Write a function that takes as parameters two parallel lists: a list of times (in increasing order), and a list of positions of a particle that correspond with the time values. The function should return a new list giving the average velocity between consecutive time measurements. The new list should have length one less than the original lists.