CS1026: Assignment 2 – Volume Calculator

Due: October 24th 2018 at 9:00pm
Weight: 8%

Learning Outcome:
By completing this assignment, you will gain skills relating to

- using loops,
- using functions,
- using lists in Python,
- creating and using Python modules,
- following program specifications.

Task:
In this assignment, you will write a **complete** program in Python that computes the volume for a number of different shapes. Your program will consist of two files: one is a module, **volume.py**, which computes volumes and the other is a main program, **main.py**, which uses the functions in module **volume.py**. The program is expected to prompt the user for a type of object (e.g. a "cube") and validate that is one of the excepted inputs before computing the volume. In addition, your program should keep track of each volume that is calculated and at the end display the volume for all the shapes. Your program should make use of functions, loops, and lists.

Functional Specifications:

1. Your main module, **main.py**, should handle the prompting and input for the different shapes and the output. Specifically, it should:

    - Prompt the user for the shape they are interested in, check to make sure that their input is valid. **Valid input options are**: "cube" or "c", "pyramid" or "p", "ellipsoid" or "e", "quit" or "q'; ***you should accept the input in any combination of upper and lower case letters.*** If the user enters an invalid option, your program should continue to prompt the user for a correct choice.

    - Your program should continue to prompt the user for different shapes until the user enters "quit" or "q'.

    - Once your program has a valid input, it should then use the correct function in **volumes.py** to prompt the user for the specific values for that shape and compute the volume (see below).

    - It should then add the resulting volume to a list of volumes for the same kinds of shapes (i.e., all cube volumes will be in the same list).

    - Once the user has entered "quit" (or "q"), your program should print the list of volumes for each shape, ***in sorted order***, from lowest to highest.

If there are no calculations are done for a specific shape then a statement should be printed. For instance if there were no pyramid calculations the output would be as shown below.

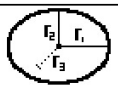
You have reached the end of your sesson.
The volumes calculated for each shape are:
Cube: 125.0, 1953.125
Pyramid: 200.0
Ellipsoid: No shapes entered

If the user enters ***quit*** option before actually calculating any volumes print a message indicating that no volumes were computed, such as:

You have reached the end of your session.
You did not perform and volume calculations

2. Your module, **volumes.py**, should contain the functions for computing volumes and prompting the user for the necessary dimensions; ***you may assume that the user enters positive integer values and so you DO NOT have to check the input for valid values.***

    - Each of your functions should calculate the volume of the shape that it corresponds to and display the resulting volume to the screen; volumes for the different shapes are computed as follows:

Shape	Volume
cube	 $volume = a^3$ where *a* is the length of a side
pyramid	 $volume = \frac{1}{3}b^2h$ where *b* is base length and *h* is height
ellipsoid	 $volume = \frac{4}{3}pi * r_1 * r_2 * r_3$ where *pi* is π and *r* is used to represent each radius

- Each function should take the result of the volume calculation and print out a message for that shape, such as:

The volume of a pyramid with base 10.0and height 6.0 is: 200.0

Non-functional Specifications:

1. Include brief comments in your code identifying yourself, describing the program, and describing key portions of the code.
2. Assignments are to be done individually and must **be your own work**. Software may be used to detect cheating.
3. Use Python coding conventions and good programming techniques, for example:
    - Meaningful variable and function names,
    - Conventions for naming variables and constants,
    - Use of constants where appropriate,
    - Readability: indentation, white space, consistency.

The name of the files you submit should be **volumes.py** and **main.py**. Make sure you upload (attach) your Python file to your assignment; ***DO NOT*** put the code inline in the textbox.

What You Will Be Marked On:

- Functional specifications:
    - Are there modules volumes.py and main.py and are they defined according to specifications?
    - Does the program compute according to the specifications?
    - Does the program handle invalid input for the type of object?
    - Is there an effective use of functions?
    - Is the output according to specifications?
- Non-functional specifications: as described above
- Assignment submission: via the OWL, though the assignment submission in OWL.