Computer Science 1 (../index.html) CPSC 1301 (../index.html)

Project 3: Ice-Cream Cone Volume

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Due Date

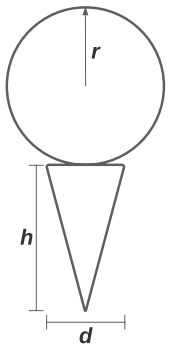
See the calendar (../calendar.html#currentWeek) for due date.

Objectives:

- Use functions
- Use the Math module

Description

For this project, you get to calculate the volume of ice-cream needed to fill an ice-cream cone and the volume of ice-cream on top of the cone. You can assume that the ice-cream cone is a simple cone and that the ice-cream scoop on top is a perfect sphere (see the diagram below).



The volume of a simple cone is π**d***d***h*/12. The volume of a sphere is 4/3*π**r***r***r*.
For this project, you get to write a Python script to calculate the total volume, based on user input.

Requirements

Write a Python 3 script that has a function that completes each of the following tasks:

1. Welcomes the user
2. Prompts the user for the height of the ice-cream cone and `returns` that value
3. Prompts the user for the diameter of the ice-cream cone and `returns` that value
4. Calculates the volume of the ice-cream cone
5. Prompts the user for the radius of the ice-cream scoop and `returns` that value
6. Calculates the volume of the ice-cream scoop
7. Calculates the total volume
8. The main body of the script

This means that your script should have at least 8 functions and therefore should have "`def`" at least 8 times.
Name the main body script, `main()`. Have it call the other functions and display each dimension and the volume for the cone, scoop and the total.
Use the `math` module for pi (π).

Additionally, round all displayed numbers to 1 decimal place (but don't round intermediate calculations).
Include a descriptive comment before each function and each major section of your code. Describe in English (not code) what the function or section does. Be sure to include any assumptions. Write it for another software developer to read, meaning one that already knows Python.

Examples (user input in **bold face blue**)

```
Please enter the diameter of the cone (in inches): 2.1
You entered 2.1
Please enter the height of the cone (in inches): 4.3
You entered 4.3
Please enter the radius of the ice-cream scoop (in inches): 1.7
You entered 1.7
The volume of the cone is 5.0 cubic inches
The volume of the ice-cream scoop is 20.6 cubic inches
The total volume is 25.5 cubic inches
```

```
Welcome to the Ice-cream Volume Calculator
Please enter the diameter of the cone (in inches): 2
You entered 2.0
Please enter the height of the cone (in inches): 4
You entered 4.0
Please enter the radius of the ice-cream scoop (in inches): 1
You entered 1.0
The volume of the cone is 4.2 cubic inches
The volume of the ice-cream scoop is 4.2 cubic inches
The total volume is 8.4 cubic inches
```

```
Welcome to the Ice-cream Volume Calculator
Please enter the diameter of the cone (in inches): 72.2
You entered 72.2
Please enter the height of the cone (in inches): 24.1
You entered 24.1
Please enter the radius of the ice-cream scoop (in inches): 18.5
You entered 18.5
The volume of the cone is 32889.7 cubic inches
The volume of the ice-cream scoop is 26521.8 cubic inches
The total volume is 59411.6 cubic inches
```

Submission

Submit your `project3.py` and your `rubric-project3.txt` to the appropriate Assignment tab/folder in CougarVIEW (https://cougarview.columbusstate.edu).

Rubric:

```
Points       Item
----------   ----------------------------------------------------------------
_____ / 10   Comments before each function and major section of code (written for another software developer; not t
oo many comments and not too few)
_____ / 40   8+ functions (including main())
_____ / 20   Correct output
_____ /  2   Completed rubric (estimates for each line including hours spent)

_____ / 72   Total


_____  Approximate number of hours spent

I, (REPLACE WITH YOUR FULL NAME), affirm that the code that I submitted is my own work and that I did not receive h
elp that was not authorized by the instructor.
```

Notes

1. Before writing any code, write the major steps as comments. Then, iteratively go through and implement each step. For example, start with welcoming the user. Verify that it works. Then, work on the next step.
2. To get the numbers to match exactly, only round the values when they are displayed (and don't store the rounded value).

Optional

1. Display the ice-cream cone and scoop with Turtle graphics. Consider adding in labels for the dimensions.

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