CSCI 111, Lab 2
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Due date: Midnight, Tuesday, September 20, on Canvas. No late work accepted.

File names: Names of files and variables, when specified, must be EXACTLY as specified. This includes simple mistakes such as capitalization.

Individual work: All work must be your own. Do not share code with anyone other than the instructor and teaching assistants. This includes looking over shoulders at screens with the code open. You may discuss ideas, algorithms, approaches, *etc.* with other students but NEVER actual code.

Setup: Log in to a computer in the lab and launch Python's IDLE from the menu. The interpreter window will have a title bar of IDLE Shell 3.10.0, where the version number may be different, but should start with 3.

The editor: Running programs in the shell is good for small tasks and makes a good replacement for a calculator. However, if we're going to write long programs we need to write the program out and save it in a file. For this we use the IDLE editor.

- In the menu bar of the IDLE shell, click on File→New.
- A new window will open up with the title Untitled.
- Use File→Save to save your file. Unless you did this for lab01, make a new folder in your home directory, or your Box directory, called `CSCI111Labs`
- Make a new folder in `CSCI111Labs` called `lab02`
- Finally, save the file as `sphere.py`

The problems: The problems all come from exercises for chapter 2 of the text, however you are required to solve the problems in a general way using functions. You will turn in three modules: `sphere.py`, `wholesale.py`, and `home.py`

sphere.py: In the file saved as `sphere.py`:

- The volume of a sphere with radius r is $\frac{4}{3}\pi r^3$.
- Use the IDLE shell to find the volume of a sphere with radius 5.
- In the `sphere.py` file open in your editor window, define a **function** `sphere`.
- When you run your file, it will print no output, but
- the `sphere` function will be defined so as to print a message like this:

```
>>> sphere(5)
The volume of a sphere of radius 5 is 523.5987755982989
```

- Check to make sure your function got the same value you did in the IDLE shell.

wholesale.py: Save a new file with the name `wholesale.py`

- Suppose the cover price of a book is $24.95, but bookstores get a 40% discount. Shipping costs $3 for the first copy and 75 cents for each additional copy.
- Use the IDLE shell to find out the total wholesale cost for 60 copies. You should get the following price, in pennies:

```
300+75*59+int(0.4*2495)*60
```

- Note that we have assumed the discount discards any fractions of a cent.
- Now write three functions with the following headers:

```
def shipping_cost(n, first_copy, extra_copy):
```

```
def wholesale_cost(n, cover_price, discount):
```

```
def total_cost(n, cover_price, discount, first_copy, extra_copy):
```

  which do the obvious things, where the total cost is just the sum of the wholesale cost and the shipping cost.
- The original problem can now be solved by running the module and then entering in the shell:

```
print(total_cost(60, 2495, 40, 300, 75))
```

  You should get the same answer as before.
- Note that the prices are all in pennies and the percentage is a percentage, not a fraction.
- Here are some results from my solution to check your work:

```
>>> total_cost(100, 2495, 40, 300, 75)
107525
>>> total_cost(20, 32595, 25, 100, 50)
164010
>>> total_cost(1000, 195, 10, 100, 5)
24095
```

home.py: If I leave my house at 6:52 am and run 1 mile at an easy pace (8:15 per mile), then 3 miles at tempo (7:12 per mile) and 1 mile at easy pace again, what time do I get home for breakfast?

- Solve the above problem using the shell.
- Open a file called `home.py` and write **several appropriate functions** to help solve the above problem.
- You can make simplifying assumptions, for example that there are only ever two paces, but that each one might be different and for different distances.
- Your computations should be in minutes as integers.
- Document each function with comments.

- Include a `print` statement at the end of the file that solves the above problem, and then several others.

Requirements:
- Each of the three files, `sphere.py`, `wholesale.py`, and `home.py` should begin with a comment block with the information like this:

```
#  home.py
#  Geoffrey Matthews
#  CSCI 111, Fall 2022
#  functions to calculate arrival at home
#  after running at varying paces
```

All programs you hand in should begin with a similar comment block!

Upon completion: Zip your `lab02` folder with the three programs, `sphere.py`, `wholesale.py`, and `home.py` and turn in the zipped file to Canvas.

Zipping: You can zip a folder in windows by right-clicking on the folder in the file browser and selecting from the popup menu:

Send to → Compressed (zipped) folder