CS51A—Assignment 1
Functions

Due Sunday, February 2 at 11:59pm

http://www.lefthandedtoons.com/245/

1   Initial Setup

Make sure that PyCharm is installed according to the installation instructions (see Assignment 0 for details). Open up PyCharm if it's closed. If you see the welcome screen again, use the `Create New Project` button, or else pick `New Project` from the `File` menu. You can call this one `assign1`; make sure its path is inside of your `cs51a` folder (which is on your Desktop folder) and that it uses

a Python 3 base environment. After you create the project, right click the project name `assign1` in the left pane, select `New` and click `Python File` to create the Python source file (or you could use `File/New...` while `assign1` is selected in the project tab). This new file should be named as `assign1.py`.

2   Basics of file system

In this section, we will introduce several basic operations about file system. These are very useful instructions that can benefit you for future assignments. For this section, wee have included instructions below for both Macs and Windows computers, so skip to the section appropriate for your OS. Once you've read the details for your OS, move on to Section 3.
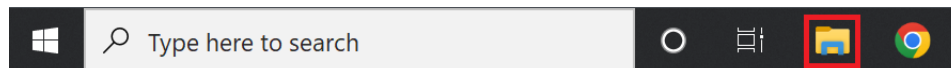
Mac

Navigate to folder on your laptop

You can navigate to different directories or folders on your laptop by opening `Finder` on Mac OS or `File Explorer` on Windows OS. They are usually located at the bottom left of your screen, with the icons like below.

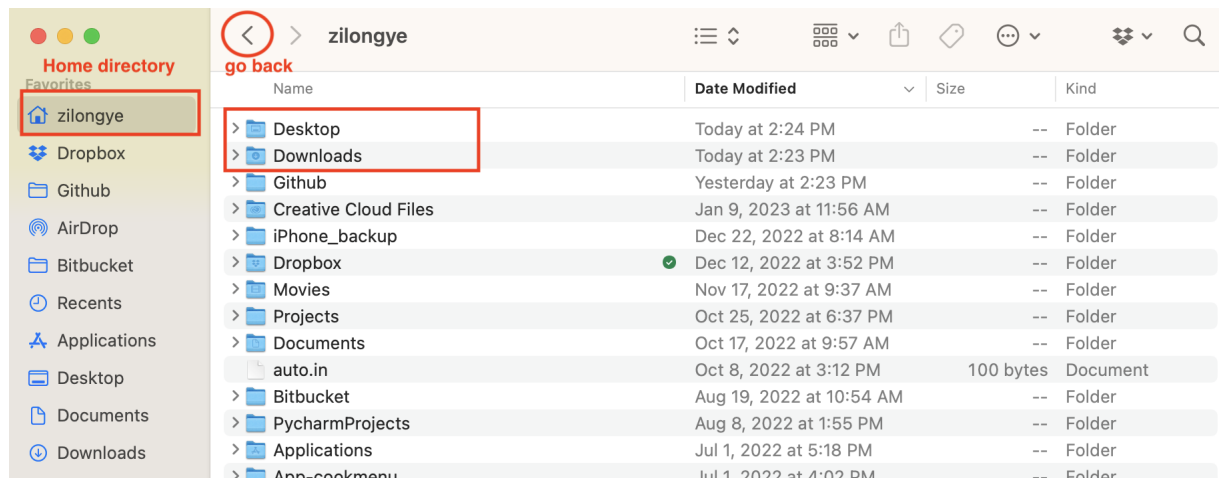(Finder on Mac OS)

(File explorer on Mac OS)

On the Mac OS, you can click on the `Finder` button to open it, and then go to the home directory or home folder on the left pane. You can find all the commonly used folders on your laptop, including `Desktop`, `Downloads`, and etc. You can double click any folder to enter it, and you will see the documents and subfolders stored inside that folder.

Move and/or copy items

You may have already known that we can use "drag and drop" to move a file from one location to another. However, sometimes, "drag and drop" is not easy, when you want to move multiple files or when you are not using a mouse but a touchpad. Below we will show you an easy way to perform the operation of moving and/or copying items on your laptop.

Some of the future assignment may involve a starter code that will help you to get started with the coding assignment. When you download the starter code, it will be stored in your `Downloads` folder by default. You will need to move the starter code from your `Download` folder to your project folder, e.g., the `assign1` subfolder under the `cs51a` folder on your `Desktop`. You can use either copy/paste or cut/paste to achieve this goal.

On Macs the shortcut for copy an item, either file or folder, is `Command + C`. The shortcut for paste an item is `Command + V`. Note that `Command + V` will keep the item at the original location, and create a new copy of the item in the new location you paste to. If you want to just move the item to the new location without keeping it in the original location, you should use `Command + C` to copy the item first and then use `Command + Option + V` to paste it to the new location. If you want to perform the copy/paste or cut/paste operations for multiple files, you can press `Command` button and click on the files to select them, and then use the above mentioned shortcut for copy/paste or cut/paste.

In addition to the above mentioned shortcuts, by default you can right-click the item to perform the operations of copy, cut and paste (as shown below). A short note for Mac touchpad users, the right-click is by clicking on the item using two fingers.
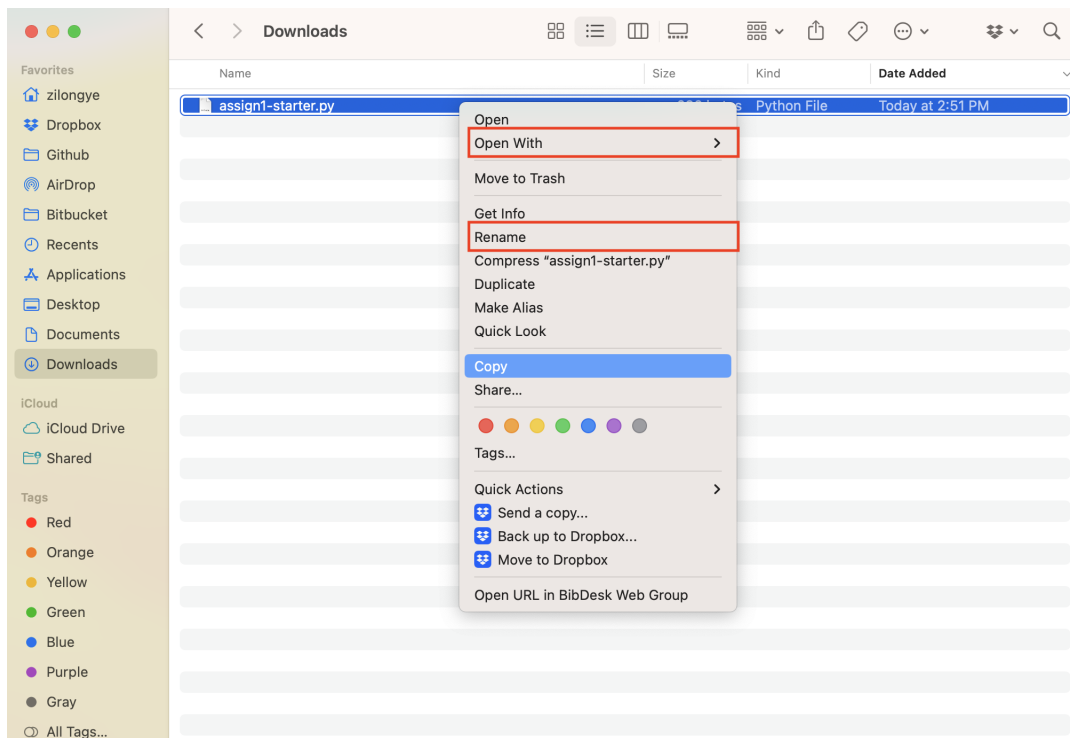
Note that there are many useful operations that can be done by using the right-click, including `Rename`, `Open with`, and etc, as highlighted in the above figure. You may need to use these in some of your future assignments.

Windows

Navigate to folder on your laptop

On the Windows OS, you can click on the `File Explorer` button to open it, and then go to `Computer`, then `C` directory, then `Users`. You can see there is a folder that has the same name as your login account, double click it and you will arrive at the home directory. In that home directory, you can find all the commonly used folders on your laptop, including `Desktop`, `Downloads`, and etc. You can double click any folder to enter it, and you will see the documents and subfolders stored inside that folder.
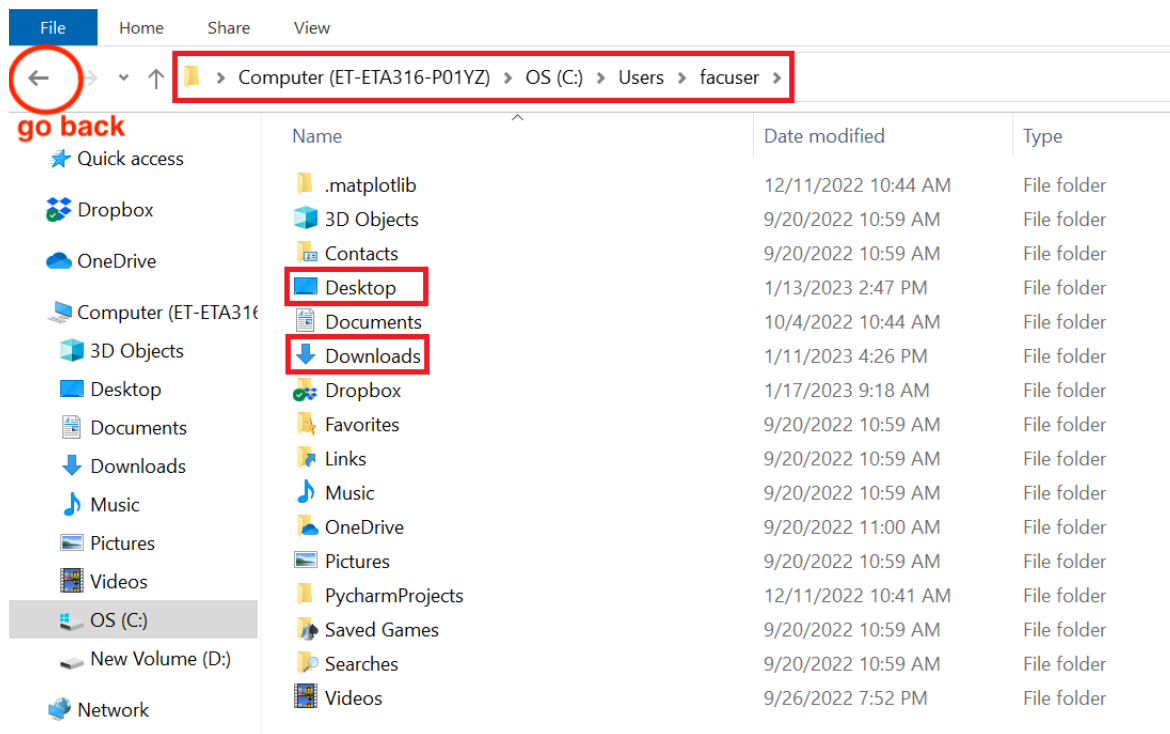
There is a "go back" button at the top of your `Finder` or `File Explorer`, which can allow you to go back to the previous folder that you just visited.

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On Windows computers the shortcut for copy an item, either file or folder, is `Ctrl + C`. The shortcut for paste an item is `Ctrl + V`. Note that this will keep the item at the original location, and create a new copy of the item in the new location you paste to. If you want to just move the file to the new location without keep it in the original location, you should use cut and paste, the shortcut of which are `Ctrl + X` and `Ctrl + C`, respectively. If you want to perform the copy/paste or cut/paste operations for multiple files, you can press the `Ctrl` button and click on the files to select them, and then use the above mentioned shortcut for copy/paste or cut/paste. In addition to the above mentioned shortcuts, by default you can right-click the item to perform the operations of copy, cut and paste (as shown below).

3   Your first function [3 points]

Define a function called `sphere_surface_area` that takes the radius as a parameter and returns the surface area of a sphere with that radius.

Remember the basic structure for defining a function is:

```
def function_name(parameter1, parameter2, ...):
    statement1
    statement2
    ...
    return something # Not all functions will have return statements!
```

The way that Python can tell what is part of the function is based on the indentation.

After you've coded up your function, you can run your program and then interact with the Python shell! (See Assignment 0 for a refresher.) For example, after running it you can click into the Python Console and type:

```
>>> sphere_surface_area(12.4)
1932.2035136000002
```

Once you're comfortable with running Python programs with your own defined functions and with playing with them in PyCharm, move on to the main part of this assignment. If you can, it's worth getting used to using a keyboard shortcut to run your program so you don't need to switch over to the mouse so often.

4 A semester abroad in Europe

http://www.bildergeschichten.eu/euro_cartoon_witz.htm

You're going to do a semester abroad in Europe and have decided to write a few functions that will help you out with some common questions you might find yourself asking while you're there.

1. [**2 points**] Write a function called `euros_to_dollars`, with a single parameter, the price in euros, and the function will return the price in dollars. Lookup the current price exchange from euros to dollars online. For example, after running your program you could type:

   ```
   >>>  euros_to_dollars(13.5)
   15.4
   ```

   (Note: depending on the exchange rate you use, your value will be slightly different)

   Make sure that you are using the `return` statement and not printing the answer in your function. In particular, try running the following and make sure you get something identical:

   ```
   >>> dollars =  euros_to_dollars(13.5)
   >>> dollars
   15.4
   ```

2. [**2 points**] Write a function called `welcome` that doesn't take any parameters and returns "welcome" in some European language (English doesn't count!). For example:

```
>>> welcome()
'te lutem'
```

Remember that you can create functions with zero parameters. To call a function without any parameters, you still need to put the parenthesis at the end.

3. [**2 points**] Write a function called `kilometers_to_miles` that takes as input the number of kilometers and returns the distance in miles. For example, after running your program you could type:

```
>>> kilometers_to_miles(100)
62.137
```

4. [**3 points**] Write a function called `mpg_from_metric` that takes *two* parameters: first the number of kilometers and second the number of liters. The function should return the miles per gallon (i.e. miles divided by gallons) by converting the kilometers and liters appropriately. Remember, to have multiple parameters for functions, you separate them with commas.

```
>>> mpg_from_metric(400, 30)
31.358472666666668
```

Extra Credit [**1 point**]: The right way to calculate the `mpg_from_metric` function is to utilize other functions you write that do some of the work for you. To calculate the mpg, write an additional function `liters_to_gallons` and then use this function and your `kilometers_to_miles` function inside the `mpg_from_metric` function.

5. [**2 points**] Write a function of your own that takes one or more parameters and returns something interesting/useful. Think of differences in distances, weights, volumes, speeds, recipes, etc. Brownie points for creative functions :)

6. [**2 points**] Write a function called `kilograms_to_pounds` that takes as input a weight in kilograms and returns the equivalent weight in pounds as a number rounded down.

```
>>> kilograms_to_pounds(13)
28
```

Hint: You can use either the `//` operator or the `int` function.

7. [**3 points**] Write a function called `kgs_to_lbs_and_oz` that takes as input a weight in kilograms and returns the weight in pounds and ounces as a string. The ounces calculated should never be more than 15.

```
>>> kgs_to_lbs_and_oz(13)
'13 kilograms is 28 lbs and 10 oz.'
```

Advice

- Work through a few examples on paper to make sure you understand the calculations.
- Use an online tool to double check your answers.
- Break the calculation down into different steps and use variables to store these intermediary values.

5   Commenting and documentation

An important part of programming is making sure that your code is well documented so that when someone else looks at it (or, more likely, you look at it a month later) you can get information about the program without having to read all of the code.

You should have the following in your program:

- Comments at the very beginning of the file stating your name, course, assignment number and the date.
- Each function should have an appropriate docstring.
- Other miscellaneous comments to make things clear. Don't go overboard, but do include comments where things are complicated or if you have a block of code that does something. For this assignment, you won't need much since the functions should all be pretty short.

In addition, make sure that you've used good *style*. This includes:

- Following naming conventions, e.g. all variables and functions should be lowercase.
- Using good variable names.
- Proper use of whitespace, including indenting and use of blank lines to separate chunks of code that belong together.

6   Ethics

Last week, we saw how biased algorithms can affect court decisions. There are numerous examples of how AI, when not properly used, can cause more harm than good. This week we will continue with reading a news article from Reuters that reports on how Amazon had to withdraw an AI recruiting tool that showed bias against women and a more recent article that surveys the landscape of AI hiring.

In 1–2 paragraphs, summarize the two articles and discuss anything surprising you learned, any questions, and any ideas you might have after reading the article. Export your document as a pdf file name `ethics1.pdf`.

7 When you're done

Submit your files (`assign1.py` and `ethics1.pdf`) online using Gradescope; be sure you're uploading them to the "assign1" assignment. Note that you can resubmit the same assignment as many times as you would like up until the deadline.

8 Grading

	points
`sphere_surface_area`	3
A semester abroad	16
comments and code style	3
file submitted correctly	1
extra credit	1
ethics prompt	1
total	24 (+1)