Assignment 1: Using Data and Variables

For this assignment, our objective is to learn how to pull in CSV data from an outside file and use variables to edit the output. ***Deliverables:*** a PDF document with your figures and your answers to the questions at the end of the assignment.

STARTING:

1. Open Pycharm and create a new project. Call it something that you will remember, as we will be using this project folder for most of the assignments.
2. From Canvas download the following :
    a. eng103_data1.csv
    b. eng103_base1.py
3. Move these downloaded files into your Assignment 1 project folder
4. In Pycharm, open up the eng103_base1.py file

EDITING THE CODE:

In this assignment, and all future assignments, the places where you have to edit the code will be denoted in the comments as follows:

```
##### EDIT HERE ######
```

In this assignment, and all future assignments, the places where you have to STOP editing the code will be denoted in the comments as follows:

```
##### STOP EDITING HERE #####
```

This way, you know which parts you can change without losing functionality in the code or adding additional errors.

> *Reminder: SPACING MATTERS IN PYTHON. You will get errors if the code is not formatted correctly.*

Now, read through the code and the comments to get a general sense of what the code is doing. *Protip: the main function of the code is actually at the bottom of the python script. Thus, start in main, then go back and look at the functions that the main function utilizes.*

EXERCISE 1: READ IN AND DISPLAY DATA FROM A CSV

First, we will read in the data from a file and set it to display in a figure. CSV files are simple ways of storing data, standing for comma separated values, where the line a datum is on and number of commas on a horizontal line help a computer infer data organization. The comma in a CSV file is one type of *delimiter*. A delimiter is a symbol that lets the computer know when one value ends and another begins. This way, the computer can parse the data and use the commas to separate the variables.

1. In the main function, find the place to add in the data CSV file
    a. Change the placeholder to the path of the CSV file
        i. In our case, the path of the CSV file will just be the name since they are stored in the same folder. However, when the CSV file is in another folder, you have to specify the whole file path so the python script can find the CSV file.
    b. Go look at the “read_in_data” function and make sure you understand what is happening to get from a CSV file to python lists.
        i. A list is a set of variables that are grouped together. The list can be called by one name, and variables within a list can also be called and used. We will explore this concept more later in the class.

2. Now, go down to the very bottom of the code in the main function. Find the function that adds a title to the plot
    a. Change the title to be your name and the assignment number

3. Next, find the function that saves the PNG
    a. Change the file name to save your png to something

4. Run the code to make sure you correctly added the CSV file, your name, and saved the PNG. The plot should be a scatter plot of black dots. **Save this PNG.**

DEBUGGING:

If your code doesn’t run, take a look at the terminal output. Python is pretty good with error messages and normally they are descriptive. Read the error message and see if you can figure out where the code went wrong.

Some tips to help you with this process:

- Check the error message for a line number, and navigate to that line
    - See if there are any typos or any obvious mistakes in the code
- Read the error message carefully
    - What words do you recognize? Do they give any clues about what went wrong?
- If you don’t understand the error message, copy it and paste it in a google search
    - Look through the results and see if it has been solved elsewhere
- If you are still having issues, reach out for help!
    - Ask your classmates if they have had similar problems
    - Ask your TAs to look over your code and see if they can help

EXERCISE 2: VARYING THE DISPLAY OF THE DATA

Next, we will look at how to change variables. One of the variables that is important in visualizations of code (especially visual art) is color.

1. First, go back to the function that saves the png and comment it out by putting # before the line. This way you can play around with changing variables and pick your favorite combinations before saving your PNG.

2. Find the set_color_assignment_1 function in the code.

3. For this assignment, we will first have all the data plot as the same color. We will change this color by changing the value of the set_color variable. It is currently set to black.
    a. Pick a new color (https://matplotlib.org/stable/gallery/color/named_colors.html) and change the value of the marker_fill_color variable.

4. Run your code to check that changing the color has worked.

5. Now that you have experience changing the color variable, play around with some other variables. Here, we've set up the marker shape, marker size, marker color(s), and marker fill type.
    a. These variables are also in the set_color_assignment_1 function

6. Another variable you can change is the background color. Navigate to the main function, and find the set_facecolor function
    a. Change the color of the background!

7. Play around with the variables and pick your favorite combination!

8. Go back to the function that saves the PNG and uncomment it by removing the #, and change the name of the PNG so it does not overwrite your PNG from Exercise 1.

9. Run your code and **save your PNG**. Check in your project folder to make sure both PNGs are saved correctly.

INCLUDE IN YOUR PDF:

1. Describe what is happening in the read_in_data function.
    a. What are the steps needed to convert a CSV file to a python list?
    b. What function within read_in_data is parsing the CSV?

2. What type is the color variable?

3. Describe your concept for exercise 2.
    a. What options did you choose for each of the variables?
    b. What helped you decide which combination of variables was your favorite? What did you visually enjoy about it?

4. Include two pngs of your final plot.
    a. PNG 1: Save a png of the plot that is created without changing the color variable.
    b. PNG 2: Save a png of the plot in a new color of your choosing by changing the color variable.

5. If you were using this base code for a larger art project, what other variables would you like to be able to change? Think about how you would normally approach an art project. For example, if you were to make a painting you might choose the colors, or where to place the colors. How could these concepts translate to variables in code?