Problem Set for 2/26/2024

Engineering 104 - Fundamentals of Engineering Computing

Formatting, Organization & Code Comments - Complete the following problems in `Python` and include as part of the submission of the appropriate assignment. Your assignment file should include a proper heading, comments and show clear organizational structure with each problem clearly printed, separated and with each result variable clearly displayed. All problems worked should have a formatted/structured print-out. Print a string denoting each problem, with the solution to the problem clearly printed as a formatted string below the denoted problem. Separate each problem using a blank line in both the code and the printed results. Code comments should be completed throughout the file on every line of code by default. If this assignment requires you to write and submit additional auxiliary script, or any other files in the submission, please append your initials capitalized to the end of the file name.

Python Lecture #17 Problems - Data I/O II (12 Points)

Problem 17.1 (6 Points) - Look up the formula for calculating the volume of a sphere as a function of its radius in millimeters. Write a program on a `Python` script file and/or function that takes user input for the sphere radius and returns the volume of the sphere. Make sure your program declares what it's asking for, and clearly declares the output. Test your program for $r = 25$ mm. Display your result to the first decimal place.

Problem 17.2 (6 Points) - Following the data example completed in class complete the following steps to download data from a location that interests you and then complete a plot comparing the high or low temperature from that location to the high or low in Sitka, AK, the data used in class. Please complete the follwing steps to retrieve your data:

1. *Visit the NOAA Climate Data Online site at `https://www.ncdc.noaa.gov/cdo-web/`. In the `Discover Data By` section, click **Search Tool**. In the `Select a Dataset` box, choose **Daily Summaries.***
2. *Select a date range, and in the `Search For` section, choose **ZIP Codes**. Enter the ZIP Code you're interested in, and click **Search**.*
3. *On the next page, you'll see a map and some information about the area you're focusing on. Below the location name, click **View Full Details**, or click the map and then click **Full Details**.*
4. *Scroll down and click **Station List** to see the weather stations that are available in this area. Choose one of the stations, and click **Add to Cart**. This data is free, even though the site uses a shopping cart icon. In the upper-right corner, click the cart.*
5. *In `Select the Output`, choose **Custom GHCN-Daily CSV**. Make sure the date range is correct, and click **Continue**.*
6. *On the next page, you can select the kinds of data you want. You can download one kind of data, for example, focusing on air temperature, or you can download all the data available from this station. Make your choices, and then click **Continue**.*
7. *On the last page, you'll see a summary of your order. Enter your email address, and click **Submit Order**. You'll receive a confirmation that your order was received, and in a few minutes you should receive another email with a link to download your data.*

The data you download will be structured just like the data we worked with in class although it might have different headers but if you follow the same steps we used you should be able to generate visualizations of the data you're interested in.