Lab 9

Ch En 263 – Numerical Tools

Due: 8 Feb. 2024

Instructions

- Complete the exercise(s) below, and submit the following files to Learning Suite:
  - Handwritten portion: scan each page (or take a picture) and combine them into a single pdf named: `LastName_FirstName_Lab9.pdf`
  - Excel portion: submit a workbook named `LastName_FirstName_Lab9.xlsx` where each worksheet tab is named "Problem_1", "Problem_2", etc.
  - Python portion: submit a separate file for each problem named `LastName_FirstName_Lab9_ProblemXX.py` where XX is the problem number.
- Warning: the LS assignment will close promptly at 11:59 pm and late assignments will only receive 50% credit.

Lab Exercises

There are two python files posted on the course website inside "Lab09Data.zip". Each is named "Lab09_ProblemXX.py" where "XX" is the problem number. Your homework is to debug these codes.

For each problem, you will also need to document your debugging process in an Excel sheet. For each bug (a problem can have multiple bugs), record your (1) observation, (2) hypothesis and (3) experiment loop in a text box in your worksheet. Record each step in the loop. After you find and fix the bug, identify whether it was a syntax error, an execution error or a logical error. In the end, you should submit 3 files:

- A fully debugged problem 1 named "LastName_FirstName_Lab9_Problem01.py"
- A fully debugged problem 2 named "LastName_FirstName_Lab9_Problem02.py"
- A workbook named "LastName_FirstName_Lab9.xlsx" with tabs "Problem_1" and "Problem_2" with your written answers.

1. Define a function called `degF_to_degC` that takes an argument in degrees Farenheit and returns one in degrees Celcius. Test it by printing: `degF_to_degC(32)` to the screen.

2. Write a function in a Python program that can evaluate the following formula,

$$y(t) = 5\left[1 - \exp\left(-\frac{(t-\theta)}{\tau}\right)\right] S(t)$$

$$S(t) = \begin{cases} 0 & \text{when } t < \theta \\ 1 & \text{when } t \geq \theta \end{cases}$$

   where t is an argument to the function, but θ and τ are variables defined inside the function. Plot y versus t for $t \in [0, 15]$ when $\theta = 5$ and $\tau = 1.8$.