ENGR 3703 Homework #2

1. Complete all steps in *python_intro_7.py*.
2. Complete all steps in *python_intro_8.py.*
3. Write a python program that will calculate the function *sin(x)*. Make sure your program meets the following requirements:
   1. The value of x can be specified and changed in the code (or as user input).
   2. The value of x_0 can be specified and changed in the code (or as user input).
   3. The definition of fractional error is:

$$\epsilon = \left| \frac{f_{true} - f_{apprx}}{f_{true}} \right|$$

   This can be expressed as *percent error* by multiplying the above equation by 100%. Note f_{true} is the true/known value of *f* and f_{apprx} is the approximate value from the Taylor series expansion with *N* terms.

   Your program should continue to calculate the Talyor series until $\epsilon \leq 10^{-6}$.

   4. Demonstrate your program works correctly by running it for the following case: $x_0 = \pi/12$, x = $\pi/2$.

4. Write a python program that will calculate the function e^x. Make sure your program meets the following requirements:
   1. The value of x can be specified and changed in the code (or as user input).
   2. The value of x_0 can be specified and changed in the code (or as user input).
   3. Your program should continue to calculate the Talyor series until $\epsilon \leq 10^{-7}$.
   4. Demonstrate your program works correctly by running it for the following case: $x_0 = 0.0$, x = 4.0.

5. Use your program from #4 to use base points, x_0 = 0.0, 0.5, 1.5, 2.0, 2.5, 3.0, 3.5 and x = 4.0 to determine the number of terms, N_ϵ required to get an answer that has $\epsilon \leq 10^{-10}$
   1. Make a graph of N_ϵ versus *h* (Note *h = x-x_0*).

For all problems upload your python code and the results of running your code. Note a screenshot showing the results is sufficient for showing the results. ***VVVVI --- Please compile this all into one document and make it into a single pdf before uploading…. We are expecting a single file with your work and will grade accordingly.***