

ENGR 3703 Homework #2

1. 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:

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

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_{approx} 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: $x_0 = \pi/12$, $x = \pi/2$.
2. 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: $x_0 = 0.0$, $x = 4.0$.
3. Use your program from #2 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. **VVVVV --- 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.**