MATH 2825 NAME: _____

Mathematica Lab #4 Due Monday December 5th 2022 by 11:30 A.M.

All work is to be done in a programming notebook either Mathematica and Jupyter (python3).
Please refer to the blackboard site for commands and examples.
Submissions must be made electronically on blackboard, consider using a GitHub repository to store your code.
You will be graded on the output that I am able to generate from your commands.

1. Let a be the digit corresponding to the last digit of your student id number, if it is 0 use 10. Consider the function

$$f(x) = x^6 - x^5 - ax^4 - x^2 + x - 1$$

   (a) Graph the function on an interval so that you can approximate the roots of the function. State your approximations clearly.

   (b) Use a built-in command to find all roots. These built-in command may use Newton's method to solve for roots.

2. Consider the curve $y = x^a$, where a is defined as above except if 1 use 11.

   (a) Graph the equation from 0 to 2.

   (b) Express the area under the curve as a limit and compute this limit.

   (c) Check your answer by using a definite integral. Explain in words why these must be the same.

3. Consider the function,

$$Si(x) = \int_0^x \frac{\sin t}{t} dt$$

   (a) Plot $Si(x)$ for $0 \leq x \leq 20$.

   (b) Find the values for x where there are local extrema, explain in words where all values would be.

   (c) Solve $Si(x) = 1$.