

Project #4
ENGR 2450

Title: Approximation of functions

Write a MATLAB program that approximates the function $f(x) = e^{-|x|} - 1$, $-1 \leq x \leq 1$ for each of the following three approximating functions for $n = 2, 3, 4, \& 5$:

1. Maclaurin series
2. Chebyshev series
3. Fourier series.

Calculate and display the squared error for each value of n . Plot the function and the approximating function for each value of n . Use a step size for x of 0.1.

The derivatives of $f(x)$ are found piecewise by the following:

$$f(x) = \begin{cases} e^x & \text{if } x < 0 \\ e^{-x} & \text{if } x \geq 0 \end{cases}$$

$$f'(x) = \begin{cases} e^x & \text{if } x < 0 \\ -e^{-x} & \text{if } x \geq 0 \end{cases}$$

$$f''(x) = \begin{cases} e^x & \text{if } x < 0 \\ e^{-x} & \text{if } x \geq 0 \end{cases}$$

Submit your MATLAB file(s) via email. This is due on 28 January 2011.