

CS2262 Spring 2007

Assignment 3: Taylor Polynomials and MATLAB

This assignment requires you to first read through Section 1.3.1 of the course textbook (Atkinson & Han) and understand the MATLAB program given to plot the Taylor polynomials for the Sint function.

- Implement the program `plot_sint` on your computer, and use it to compare different degrees of approximation on the intervals $[0,1]$, $[0,2]$, $[0,3]$, $[0,4]$. Comment on the accuracy of the approximation. [Submit the m-file and your comments]
 - Modify the program by allowing for larger degrees of approximation, for example, in the program use `degree = [4, 8, 12, 16]`. Repeat the first part and also consider longer intervals $[0, b]$. [Submit the m-file and your comments]
 - Modify the program to plot the five degrees of approximation `degree = [2, 4, 8, 16, 32]` [Submit the m-file]
2. In analogy with `Sint x`, prepare a MATLAB program for evaluating

$$\text{Cint}x = \frac{1}{x} \int_0^x \frac{1 - \cos(t)}{t^2} dt, \quad -1 \leq x \leq 1$$

Use the same error tolerance as in (Atkinson & Han, Eqn 1.42) for `Sint x`. For comparison purposes $\text{Cint}(1) \approx 0.486385376235$. Prepare a graph of `Cint` on $[-1,1]$.

3. For $f(x) = e^x$, find a Taylor approximation that is in error by at most 10^{-7} on $[-1,1]$. Using this approximation, write a function program to evaluate e^x . Compare it to the standard value of e^x obtained from the MATLAB function `exp(x)`; calculate the difference between your approximation and `exp(x)` at 21 evenly spaced points in $[-1,1]$.

Due February 8th 2007

Email completed assignments to cs2262_assignments@cct.lsu.edu