

ECE 3340 Numerical Methods

Homework 10: Properties of Linear Systems

Name:

ID:

Problem 1: Finite Differences

Compare the relative error using the central difference method to approximate

$$\frac{d}{dx}e^{-x} \sin\left(\frac{x^2}{2}\right)$$

at $x = 2$ using spacing $h = 1, 0.1$, and 0.01 . Keep 3 significant digits from your function evaluations.

$h = 1$

$h = 0.1$

$h = 0.01$

Problem 2: Integration

Compare the relative errors for the integral using two iterations of the trapezoid rule and one iteration of Simpson's rule. Keep 3 significant digits from the function evaluations.

$$\int_0^1 \sqrt{1-x^4} dx = 0.874$$