

University of Central Florida
School of Electrical Engineering and Computer Science
EGN-3420 - Engineering Analysis.
Fall 2009 - dcm

Project 4 due Thursday week 14 (100 points)

This project covers numerical integration and differentiation. The material required for this project can be found in Chapters 18 and 19 of the textbook.

Task 1 (30 points). The distribution function of a normally distributed continuous random variable X is defined as:

$$f_X(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}.$$

Use Matlab to: (1) integrate this function from $x = -1$ to $x = +1$ and from $x = -2$ to $x = +2$; determine the inflexion points of the function.

Task 2 (40 points). Write a Matlab function $f(x)$ to estimate the derivative of a function using Romberg's algorithm. Test your function using $f(x) = 5xe^{-2x}$.

Task 3 (30 points). Develop a function to estimate the first-derivative for a vector of unequally spaced data. The input of the function are x , a vector of the independent variable and y a vector of the dependent variable and the output is dy the vector of the estimates of the derivative. Test your function using the following data:

x	y
0.6	0.9036
1.5	0.3734
1.6	0.3261
2.5	0.08422
3.5	0.01596