<In the Name of God>

Numerical Analysis

Instructor: Dr. Hamed Masnadi-Shirazi

$$\text{erf}(z) = \frac{2}{\sqrt{\pi}} \int_0^z e^{-t^2} dt$$

HW #2

(Late HWs will get a zero grade.)

(Note: getting help or helping others on this HW is NOT allowed!)

$$\text{erf}(z) = \frac{2}{\sqrt{\pi}} \int_0^z e^{-t^2} dt$$

1) **Numerical Integration**: The erf() function is defined as . This function has many uses in probability and statistics. Unfortunately, this integral does not have a closed form solution. (a) plot the function (2/sqrt(pi))*exp(-t^2). (b) Use the Composite Simpson's Rule with N=1,000 to compute the value of this integral at erf(0.5), erf(1), erf(2) and erf(3). (c) Compare your results to the erf() function defined in Matlab. Are your results close to what you get from the Matlab erf() function? (d) Repeat the above with N=10,000 and compare to erf() in Matlab. (e) Using your own code above, write a program that plots erf(x) on the interval [0 3] at the points x=0, 0.1, 0.2, …., 2.9, 3 using N=1,000 and the Composite Simpson's Rule. What is erf(x) as x goes to infinity?

2) **Total Impulse**: The total impulse is defined as the area under the Thrust-Time curve. Using the data below
   Time={ 0 1 6 11 16 21 26 31 36 41 46 51}
   Thrust={ 0 7.2330 25.0000 53.4446 77.5804 90.7398 96.4352 98.6660 99.5060 99.8178 99.9330 100}
   find the total impulse of our rocket using the Trapezoid Rule. Compare your results to the trapz(x,y) function of Matlab.

Submission Guide: submit your Matlab program on a CD. Submit the plots and the output of your program on paper. Failing to follow the above guidelines will result in a ZERO grade!