<In the Name of God>

Numerical Analysis Fall, 2015

Instructor: Dr. Hamed Masnadi-Shirazi

HW #1

Due Date: TBA (Late HWs will get a zero grade.)

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

Assume that you are designing a rocket engine. The thrust generated by your engine over time is measured and shown in the table below. (a) What is the thrust at Time=18 ? (b) At what time will your rocket generate a Thrust=88 ?

Time={ 1   6   11   16   21   26   31   36   41   46}

Thrust={7.2330   25.0000   53.4446   77.5804   90.7398   96.4352   98.6660   99.5060   99.8178   99.9330}

Method:

1) Write a Matlab program to perform polynomial interpolation. Find the estimated thrust at Time=18 using the 1st, 2nd, 3rd, 4th 5th, ….and 9th degree polynomials.

2) Write a Matlab program to find roots using Newtons method. Use this to find when the above 2nd degree polynomial using the data points [11 16 21] crosses Thrust=88.

3) Check your results using the fzero.m function in Matlab.

   Submission Guide: submit your Matlab program. Your Matlab program should be well commented. Plot the original data points and the 2nd degree polynomial that you found in a single plot. Also include in the plot the point where the polynomial crosses Thrust =44 and show the time this happens. Also include all your calculation for finding

the 2nd degree polynomial coefficients. <u>Failing to follow the above guidelines will result in a ZERO grade!</u>

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