MATH 248 FALL 2017 – LABORATORY ASSIGNMENT 7 – Sochacki
DUE: Thursday December 14, 2017
POINTS: 50

You are to write a Matlab script that will determine approximations to

$$\int_a^b e^{\cos x} \, dx$$

using the left end point method, the right end point method, the midpoint rule, the trapezoidal rule and Simpson's rule. You will ask the user for *a* and *b* and how accurate you are to approximate the definite integra1 (the error estimate). Your program should determine the number of subdivisions to guarantee this accuracy.

Guidelines:

(1) First you should do a neat one-three page (8.5 x 11) write up showing the five methods for approximating

$$\int_a^b e^{\cos x} \, dx$$

with graphs for each method where [a,b] is one period of $e^{\cos x}$. You should also have the error estimate for each method. You will need these error estimate formulas for you program.

If you come up with your own formulas and error estimates include these for bonus points.

(2) Your program should print the output in a nice formatted table and use functions. You should also print out (L+R)/2 and (2M+T)/3 with the same format to show the rules relating numerical integration.

(3) You can do the following bonus problems for 2 points each.
    (i)   Give a general integral formula for Newton divided difference polynomial.
    (ii)   Give a general integral formula for Lagrange interpolating polynomial.

Your matlab codes should have variable names that are descriptive. Your coding should be top down and efficient. Make sure the number of calculations is minimized. Your input and output should be well labeled with easy to read instructions. Your turn in should be neat and professional.