

## APSC 607: Project 2

Submit date, time and method: 09/27/17 5pm (EST) electronically (i.e. email)

You need to submit a report (pdf format) and the individual matlab files. Please compress all the matlab files into one file before you send them.

### Important general comments:

- 1) Be careful to make sure that when you use material you didn't generate yourself to include references. Failure to do so is consider **plagiarism** and will result in a **reduction of the final grade by 50% !!!**
- 2) Do not use "breaks" in your MATLAB functions. These are bad coding practices that make code illegible and I **will subtract half the points** on the MATLAB component if you use "breaks" or other ways to terminate a loop before exiting the loop.

### Task

Write in Matlab functions to calculate the integral of the following functions using the composite midpoint rule, trapezoidal rule and Simpson's rule.

a)  $\int_0^2 e^{2x} \sin(3x) dx$

b)  $\int_0^2 \frac{1}{x+4} dx$

- Choose h and n carefully.
- What h and n do you need to use for the final result to approximate the analytic solution to within  $10^{-4}$ ,  $10^{-8}$ .
- What is the best tolerance level I can reach? What h and n were needed to reach this tolerance level? What happens if I make h smaller?
- Would an adaptive scheme be useful for either of these integrals? What if integral boundaries were moved?

BONUS points: Implement adaptive composite Simpson's rule and repeat prior questions.

### What to turn in

Turn in all the MATLAB code that you wrote to reach the final solution. Also turn in a report describing the methods, your results and discuss your findings.