Assignment 4, MATH/COSC 3416, Numerical Methods I
Due Date: Friday, Mar. 18, 2011

NOT ALL QUESTIONS WILL BE MARKED

Question 1 (Trapezoidal Rule)

(a) Page 200, Problems 5.2.2, 5.2.3, 5.2.5

(b) Page 203, Computer Problems 5.2.2 (a) and (b) only

Use our `trap` function for this problem and compute the values of the integral using $n = 10$, 100, 1000, 10000. Ignore reference to computer problems 5.2.1.

Question 2 (Recursive Trapezoidal Rule)

Approximate $\int_0^\pi \sin x\,dx$ using the recursive trapezoidal rule to compute $R(0,0)$ (step size $h = \pi$), $R(1,0)$ (step size $h = \pi/2$), $R(2,0)$ (step size $h = \pi/4$), and $R(3,0)$ (step size $h = \pi/8$). Do it by hand (NOT Matlab) keeping 6 significant figures in each calculation.

Question 3 (Simpson's Rule)

(a) Pages 227, Problem 6.1.2 (b), 6.1.4. NOTE: in 6.1.2(b) assume that $|f^{(4)}(\xi)| \leq 313.1$.

(b) Do Question 1(b) but now use our `simp` function for n=10, 100, 1000, 10000.

Question 4 (Romberg Algorithm)

(a) Pages 212–213, Problems 5.3.1, 5.3.5

(b) Pages 214–215, Computer Problems 5.3.1, 5.3.9

Use our `romberg` procedure to do these problems.