Math 112
Dr. Sarah Raynor
Due: September 1, 2009

Homework #1: Sections 5.1 and 5.2

Complete each question below. Answers should be carefully written up, showing all necessary work for each step to complete each problem. Your turned-in work should be neat and legible. If I cannot understand or follow your work you will not get credit for it. You may discuss these problems with myself, the TAs and Math Center tutors, and your classmates, but once you start writing up the problem to turn in, you must complete the writeup on your own. This assignment is out of **31 points**. It is due at the **start of class** on **Tuesday, September 1**.

1. Consider the function $f(x) = \sin(x)$ on the interval $[-\frac{\pi}{2}, \frac{\pi}{2}]$.

   (a) (3 points) Using right endpoints and 4 subintervals, estimate the value of the area under $f(x)$ over the given interval. Sketch the function and approximating rectangles.

   (b) (2 points) Is your answer in part (a) an over- or underestimate? Justify your response.

   (c) (5 points) Repeat parts (a) and (b) with the midpoint method.

2. (5 points) Complete Problem #14 in Section 5.1 of Stewart, showing your work. Make your estimate an overestimate.

3. (10 points) Set up a Riemann sum for the $\int_1^2 (x^2 + 3x)dx$. Then use the summation formulae in Section 5.2 to find an exact value for the integral.

4. (a) (3 points) Reexpress the following Riemann sum assuming that an equal partition and right endpoints are used:

$$\lim_{n\to\infty} \sum_{i=1}^{n} \frac{\cos x_i}{x_i} \Delta x \qquad [\pi, 2\pi].$$

   (b) (3 points) Reexpress the following Riemann sum as a definite integral. (Find the function and the limits of integration):

$$\lim_{n\to\infty} \sum_{i=1}^{n} \frac{2}{n} \left(5 + \frac{2i}{n}\right)^{10}.$$