Practice Exam II A

MA2160 Sections 6 and 8 Exam 2

March 17, 2004

Do all problems

Show all work

1. Consider the integral $\int_0^\pi sinx\ dx$.

(a) Find its exact value.

(b) Divide the interval $[0, \pi]$ into two equal subintervals. Write the formula you would use to evaluate SIMP(2), and then evaluate SIMP(2). In order to do this problem, you will also need to use the formulas for LEFT(2), RIGHT(2), TRAP(2), and MID(2), so make sure you write down those formulas also.

2. Evaluate the integral $\int_2^\infty \frac{1}{x^3}\ dx$ exactly or show that it diverges. Use proper notation.

3. Consider the region, R, bounded by the lines $x = 0$ and $x = 2$, and by the curves $y = x^2$ and $y = e^x$.

(a) Sketch a graph of the region, R.

(b) Subdivide the interval $[0, 2]$ into subintervals. On the graph in part (a), show the subintervals, and show a rectangle on the $i - th$ subinterval which you would use in setting up a Riemann Sum for the area of R.

(c) Write down the Riemann Sum that approximates the area of R.

(d) Write an integral for the area of R, and evaluate it.

4. Consider the region, R, bounded by the lines $x = 0, x = \pi$, and $y = 0$, and by the curve $y = sinx$.

(a) Subdivide the interval $[0, \pi]$ into n equal subintervals. Sketch a graph of the region, R, along with a corresponding rectangle on one of the subintervals.

(b) Revolve the region, R, about the line $y = -1$ to produce a solid of revolution. Show a graph of the rectangle of part (a) revolved about the line $y = -1$. What kind of a solid figure is the revolved rectangle?

(c) Write down the Riemann Sum that approximates the volume of the solid region in part (b).

(d) Write an integral for the volume of the solid region in part (b), but do <u>not</u> evaluate it.

(e) Assume that the mass density of the solid of revolution in part (b) is constant. Write a formula for the $x-$coordinate of the center of mass of the solid, but do <u>not</u> evaluate the integral(s).

5. An underwater viewing window is built into a building at the edge of a lake. The window is trapezoidal, with one of the parallel sides of length 5 feet and the other of length 3 feet. The window is vertical, with the longer side on the top. The window is 4 feet high, and the top of the window is 12 feet below the surface of the water. Find an integral for the force of the water on the window, but do <u>not</u> evaluate it.