Math 132
Worksheet 5 – February 21, 2012

Name ____________________________

1. Consider the solid of rotation obtained by rotating $f(x) = x^{3/2}$ around the x-axis for $1 \le x \le 2$. (Assume that it has uniform mass density δ.)

   (a) By a symmetry argument, conclude that the center of mass with respect to y is 0.

   (b) By integrating, find the center of mass with respect to x.

2. Show that $\ln 2 \approx 0.69$ without a calculator!

   (a) Set up an integral representing $\ln 2$.

   (b) Find a sufficient n so that Simpson's Rule will calculate this integral with error at most $0.005 = \frac{1}{200}$. (Remember that n must be even.)

   (c) Calculate the Simpson's Rule estimate from (b).
   Use a calculator, or leave it as a sum of fractions.

3. It is an important fact from probability theory that

$$\int_{-2}^{2} \frac{1}{\sqrt{2\pi}} e^{-x^2/2}\, dx \approx 0.95.$$

Determine a number n of subintervals sufficient for the Trapezoid Rule T_n to calculate the given integral with error at most 0.005.

4. Determine a number n of subintervals sufficient for the Trapezoid Rule T_n to calculate

$$\int_{-2}^{1} \frac{1}{\sqrt{2\pi}} e^{3x^2}\, dx$$

with error at most 0.005.

5. If you want more practice, find a sufficient number of subintervals to approximate the integrals in 3 and/or 4 with Simpson's Rule.