

## Math 12 Spring 2009: Exam 2

**Name:**

**Instructions:** There are 4 questions on this exam each of which is scored out of 8 points for a total of 32 points. You may not use any outside materials (eg. notes or books). You may use your calculator **ONLY** for problem 1. You have 50 minutes to complete this exam. Remember to fully justify your answers.

**Score:**

**Problem 1.** Consider  $\ln 2 = \int_1^2 \frac{1}{x} dx$ . Use only one of midpoint rule, trapezoidal rule, or Simpson's rule to answer the following two questions.

- (a) How many terms are needed to approximate this integral to within  $\frac{1}{250}$ ?
- (b) Find the value to within  $\frac{1}{250}$ .

**Problem 2.** For the following two improper integrals. Determine whether they converge or diverge. If they converge find their value.

(a)  $\int_0^1 \frac{x^3}{\sqrt{1-x^2}} dx$

(b)  $\int_1^\infty \frac{1}{x-\ln x} dx.$

**Problem 3.** Find the arc length of the part of the curve  $y = \frac{1}{6}x^3 + \frac{1}{2}x^{-1}$  from  $x = 1$  to  $x = 2$ .

**Problem 4.** Find the volume when the region bounded by  $y = 2x^4$  and  $y = x^2 + 1$  is rotated about the  $x$ -axis.