

Math 125, Midterm #1, 10/23/03

Name: \_\_\_\_\_

Section: \_\_\_\_\_

Write your final answer to each question in the space provided to the right. You must show your work to receive credit for a correct answer. Partial credit will be awarded. You may use a non-graphing calculator and one 8 1/2 x 11 sheet of **handwritten** notes.

1. Find  $F''(x)$  where

$$F(x) = \int_0^{e^x} (\ln z)^2 dz$$

\_\_\_\_\_ (10)

2. A tomato is thrown vertically upward from ground level toward the ceiling of a tall barn. The ceiling height is 20 meters. With what velocity must the tomato be thrown so that it *just reaches* the ceiling (assume the tomato has 'point' size)? For ease of calculation, assume that the acceleration due to gravity is 10 meters/second<sup>2</sup>.

\_\_\_\_\_ (10)

3. Use the midpoint rule and five (5) rectangles to estimate the value of the definite integral

$$\int_{3/4}^2 \ln x \, dx$$

Calculate the answer accurate to 2 decimal places.

\_\_\_\_\_ (10)

4. Find the volume swept out by rotating the area bounded by  $y = x - x^2$  and  $y = 0$  about the  $y$ -axis.

\_\_\_\_\_ (10)

5. The force required to move an electrically charged particle through a particular electric force field is given by

$$F(x) = x \sin(x^2) + \sin(x) \cos(x)$$

where  $F(x)$  is given in Newtons. How much work is required to move the particle from  $x = -\pi/2$  to  $x = \pi/2$  where  $x$  is measured in meters?

\_\_\_\_\_ (10)