Math 125 - Spring 2006
Exam 1
April 20, 2006

Name: ____________________________________________

Section: __________________________________________

Student ID Number: ________________________________

TA’s Name: ________________________________________

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• You are allowed to use a basic scientific calculator (NO graphing calculators)
• You may use one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
• Check that your exam contains all the problems listed above.
• You must show your work on all problems. The correct answer with no supporting work may result in no credit.
• Box in your final answer.
• When appropriate, round your final answer to two decimal places after the decimal.
• Any student found engaging in academic misconduct will receive a score of 0 on this exam.
• You have 80 minutes to complete the exam.

GOOD LUCK!
1. Evaluate the following indefinite integrals.

(a) (5 points) \[ \int \frac{\sin(4 + \ln(y))}{y} \, dy \]

(b) (5 points) \[ \int x^3 \sqrt{18 - x^2} \, dx \]
2. Evaluate the following definite integrals.

(a) (5 points) \[ \int_1^e \frac{\sqrt{x} + 3x}{x^2} \, dx \]

(b) (5 points) \[ \int_0^{\pi/2} \cos(x) (\sin(x))^{1/3} \, dx \]
3. A particle is moving on a straight line with acceleration given by \( a(t) = -2t + 1 \) and initial velocity \( v(0) = 2 \).

(a) (3 points) Find the velocity, \( v(t) \), for the particle at time \( t \).

(b) (3 points) Find the displacement of the particle from \( t = 0 \) to \( t = 3 \).

(c) (3 points) Find the total distance traveled by the particle from \( t = 0 \) to \( t = 3 \).
4. (6 points)

The graph to the right illustrates the region bounded by the two curves

\[ x = 2y \quad \text{and} \quad y = -x^2 + 3.5x + 4. \]

Find the area of this region.

5. (5 points) Use the midpoint rule with \( n = 3 \) rectangles to approximate the value of the integral:

\[ \int_{0}^{6} \sqrt{x^3 + 1} \, dx \]
6. Consider the region bounded by the curves \( y = x^2 \) and \( y = 3x \) and answer the following.

(a) (5 points) Using the method of cylindrical shells, express the volume of the solid of revolution obtained when this region is rotated around the \( y \)-axis in terms of a definite integral. DO NOT EVALUATE THE INTEGRAL.

(b) (5 points) Express the volume of the solid of revolution obtained when this region is rotated around the horizontal line \( y = -2 \) in terms of a definite integral. DO NOT EVALUATE THE INTEGRAL.