Math 132, Exam 1 Fall 2002

- No papers or notes may be used, but you can use your calculator.
- Please don't just give an answer. Clearly explain how you get it.
- This is a 2 hour exam.

1a) [10 points] Find the general indefinite integral:

$$\int \frac{\ln(x)}{x} dx$$

1b) [10 points] Evaluate the integral:

$$\int_1^3 \sqrt{x}(x^{3/2} - \frac{3}{x}) dx$$

2) [10 points] An animal population is increasing at a rate given by the function $f(t) = 10e^{2t}$ animals/year. What is the total change in animal population between the fifth ($t = 5$) and the seventh ($t = 7$) year ?

3) [10 points] If

$$F(x) = \int_0^{\sin x} te^t dt,$$

a) find $F'(x)$
b) find $F(\pi)$.

4) [10 points] Estimate the area under the graph of $f(x) = x^2 + 2$, between 0 and 4,
a) Using 4 rectangles and *left* endpoints. Plot the relevant graph showing the rectangles.
b) Is your estimate in a) an underestimate or an overestimate ?
c) Find the actual area.

5) [10 points] The velocity of a particle is given by $v(t) = 6 - 3t$ m/sec. What is the *total displacement* of the particle between $t = 0$ sec and $t = 3$ sec ? What is the *total distance* it has traveled between these times ?

6) [10 points] A particle (that can move along the x-axis) at $t = 0$ sec is at $x = 0$ m, with speed $v = 0$ m/sec. From that moment onwards the particle has a constant acceleration $a = 5$ m/sec^2. At what distance x (in meters) will the particle have a speed of $v = 10$ m/sec ?

7) [10 points] Sketch the region enclosed by the curves $y = |x|$ and $y = x^2 - 2$ and evaluate its area.

8) [10 points] Find the volume of the solid obtained by rotating the region bounded by $y = \frac{1}{\sqrt{x}}$ and $y = x$, between $x = 1$ and $x = 2$ around the x-axis.