Math 107, Ledder **EXAM 1: 1/30/03** **Name** _____

Show your work for full credit. **TA** _____

1. (10 points) Compute $\displaystyle\int_0^1 \frac{x}{\sqrt{x^2+4}}\,dx$. You must have the exact answer in fully simplified form to get full credit.

2. (8 points) A solid has its base in the portion of the first quadrant of the xy-plane that is bounded by the x and y axes and the graph of $y = \cos x$. The cross-sections perpendicular to the x-axis are squares with one side in the xy-plane. Derive an integral to determine the volume of the object. DO NOT COMPUTE THE INTEGRAL.

3. Compute each of the following quantities:

   (a) (5 points) $\displaystyle\int_1^2 \frac{\ln x}{x}\,dx$

   (b) (5 points) $\displaystyle\int x^2 f'(x^3)\,dx$, where f is some known function

4. (10 points) Derive an integral to determine the area enclosed by the graphs of $y = x + 2$ and $y = x^2$. DO NOT COMPUTE THE INTEGRAL.

5. (10 points) The region enclosed by the lines $y = 0$, $y = 2x$, and $x = 1$ is rotated about the line $x = -1$.

   (a) (10 points) Set up an integral for the volume using the disk-and-washer method. Support your work with a suitable sketch. DO NOT COMPUTE THE INTEGRAL.

   (b) Set up an integral for the volume using the cylindrical shell method. Support your work with a suitable sketch. DO NOT COMPUTE THE INTEGRAL.