Math 142, Exam 2, Spring 2006

Write your answers as legibly as you can on the blank sheets of paper provided. Use only **one side** of each sheet. Be sure to number your pages. Put your solution to problem 1 first, and then your solution to number 2, etc.; although, by using enough paper, you can do the problems in any order that suits you.

There are 10 problems. Each problem is worth 10 points. SHOW your work. Make your work be coherent and clear. Write in complete sentences whenever this is possible. $\boxed{CIRCLE}$ your answer. **CHECK** your answer whenever possible. **No Calculators.**

If I know your e-mail address, I will e-mail your grade to you. If I don't already know your e-mail address and you want me to know it, then **send me an e-mail**.

I will post the solutions on my website a few hours after the exam is finished.

1. Find $\int \cos^3 x dx$.

2. Find $\int \cos^4 x dx$.

3. Find $\int \tan^3 x dx$.

4. Find $\int \sin 4x \cos 3x dx$.

5. Find $\int xe^x dx$.

6. Find $\int xe^{x^2} dx$.

7. State BOTH parts of the Fundamental Theorem of Calculus.

8. Find $\lim\limits_{x \to \infty} \left(\frac{x-2}{x}\right)^x$.

9. Consider the region bounded by $y = \ln x$, the x-axis, $x = 1$, and $x = 2$. Revolve this region about the y-axis. Find the volume of the resulting solid?

10. Suppose that a conical tank is filled with oil, which has a density of 50 lb/ft ^{3}. The radius at the top of the tank is 6 feet and the tank is 20 feet high. **Set up** an integral which gives the work which is done in pumping the oil over the edge of the tank. **You are not required to calculate the integral.** (Be sure to give the units for your answer.)