Math 142 Exam 2 Spring 2004

PRINT Your Name:____________________________________

There are 10 problems on 6 pages. Each problem is worth 10 points. SHOW your work. $\boxed{CIRCLE}$ your answer. **NO CALCULATORS! CHECK** your answer whenever possible.

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**.

If you would like, I will leave your exam outside my office after I have graded it. (If you like, I will send you an e-mail when I am finished with it.) You may pick it up any time between then and the next class. **Let me know if you are interested.**

I will post the solutions on my website at about 4:00 PM today.

1. Find $\int \sin^3 x \cos^4 x \, dx$. Check your answer.

2. Find $\int \frac{x}{x^2+4} \, dx$. Check your answer.

3. Find $\int \frac{1}{x^2+4} \, dx$. Check your answer.

4. Find $\int \frac{1}{\sqrt{x^2+4}} \, dx$.

5. Find $\int \cos^4 x \, dx$.

6. If $y = \arcsin(e^{2x})$, then find $\frac{dy}{dx}$.

7. Evaluate $\sin(2 \arccos(\frac{1}{10}))$.

8. Find the area of the region bounded by $y = e^x$, the $y-$ axis, and the line $y = e^3$.

9. Newton's law of cooling states that the rate at which an object cools is proportional to the difference in temperature between the object and the surrounding medium. Thus, if an object is taken from an oven at 400° F and left to cool in a room at 70° F, then its temperature T after t hours will satisfy the differential equation

$$\frac{dT}{dt} = k(T - 70).$$

   If the temperature fell to 200° F after one hour, what will it be after 4 hours? (You may leave " ln " in your answer.)

10. Let $f(x) = xe^x$. Where is $f(x)$ increasing, decreasing, concave up, and concave down? Find the local maxima, local minima, and points of inflection of $y = f(x)$. Graph $y = f(x)$.