PRINT Your Name:________________________________

There are 10 problems on 5 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 door tomorrow morning, 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 $\int e^{2x+3}dx$. Check your answer.

2. Find $\int xe^{2x^2+3}dx$. Check your answer.

3. If $y = e^{\left(\frac{1}{x^3}\right)} + \dfrac{1}{e^{(x^3)}}$, then find $\frac{dy}{dx}$.

4. If $y = \sin x \ln x$, then find $\frac{dy}{dx}$.

5. Find $\int \frac{\ln x}{x}dx$. Check your answer.

6. Find $\int \frac{e^x}{\sqrt{e^x+1}}dx$. Check your answer.

7. Find the area of the region bounded by $y = e^x$, the $y-$ axis, and the line $y = e^2$.

8. Let $f(x) = \frac{x-2}{x+3}$ for $x \neq -3$. Find $f^{-1}(x)$. What is the domain of $f^{-1}(x)$? Verify that $f(f^{-1}(x)) = x$ for all x in the domain of $f^{-1}(x)$.

9. A bacterial population grows at a rate proportional to its size. Initially the population is $12,000$ and after 6 days the population is $20,000$. How long will it take the population to triple? (You may leave " ln " in your answer.)

10. Let $f(x) = x\ln x$. What is the domain of $f(x)$? 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 $y = f(x)$.