

Math 142, Exam 2, Fall 1998

PRINT Your Name: _____ Recitation Time _____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. CIRCLE your answer. **NO CALCULATORS! CHECK** your answer whenever possible.

1. Find $\int e^x \sin 4x \, dx$.
2. Find $\int \frac{x}{\sqrt{16 - 9x^2}} \, dx$.
3. Find $\int \frac{1}{\sqrt{16 - 9x^2}} \, dx$.
4. Let $f(x) = e^x - x$. 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 $y = f(x)$.
5. Find $\int \ln x \, dx$.
6. Find $\int \sin^2 x \cos^3 x \, dx$.
7. Find $\int \sin^2 x \, dx$.
8. Find $\int \frac{\ln x}{x} \, dx$.
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 75°F , then its temperature T after t hours will satisfy the differential equation

$$\frac{dT}{dt} = k(T - 75).$$

If the temperature fell to 200°F after one hour, what will it be after 3 hours?

10. Find $\int \cos 4x \cos 3x \, dx$.