Math 142, Exam 4, 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. CHECK your answer whenever possible.

NO CALCULATORS!

1. Find \( \int_{-8}^{1} \frac{1}{\sqrt[3]{x}} \, dx \). 

2. Find \( \int \sin^3 x \cos^4 x \, dx \). 

3. Find \( \int \frac{\ln x}{x^3} \, dx \). 

4. Does the series \( \sum_{n=1}^{\infty} \frac{n}{e^n} \) converge or diverge? Justify your answer.

5. Does the series \( \sum_{n=1}^{\infty} \frac{2n-1}{n^3+1} \) converge or diverge? Justify your answer.

6. Where does the function \( f(x) = \sum_{n=1}^{\infty} (x - 7)^n \) converge?

7. Approximate sum of the series \( \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^4} \) with an error of at most \( \frac{1}{100} \). (Be sure to explain what you are doing.)

8. A ball is dropped from the height of 10 feet. Each time it hits the floor it
rebounds to \( \frac{2}{3} \) its previous height. Find the total distance it travels.

9. Let \( f(x) = xe^{3x} \). 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 \( y = f(x) \).

10. Use Simpson’s rule to estimate the area of the following shape. All
measurements are in feet.