Exam 1, Math 142, Fall 1998

PRINT Your Name:_____ Section:_____

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.

1. If $y = x^2 \ln x^2 + (\ln x)^3$, then find $\frac{dy}{dx}$.

2. Let $f(x) = 2x^2 + x - 4$ for $x \leq -\frac{1}{4}$. Find $f^{-1}(x)$.

3. Find the area of the region bounded by $y = e^x$, and the line through $(0, 1)$ and $(1, e)$.

4. Simplify $\cos\left[\cos^{-1}(\frac{4}{5}) + \sin^{-1}(\frac{12}{13})\right]$.

5. Find $\int \frac{\cos x}{\sin x} dx$.

6. Let $f(x) = xe^{2x}$. 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 $y = f(x)$.

7. If $y = x^3 + 3^x$, then find $\frac{dy}{dx}$.

8. The population of the United States was 4 million in 1790 and 180 million in 1960. If the rate of growth is assumed proportional to the number present, what estimate would you give for the population in 2020? (You may leave " ln " in your answer.)

9. Find $\int \frac{1}{x \ln x} dx$.

10. Find $\int (\frac{1}{e^{2x}} + \frac{1}{2x-1}) dx$.