NAME_____

Math 12
Test 3
Spring 2010

You have 50 minutes to complete this test. You must *show all work* to receive full credit. Work any 6 of the following 7 problems. Clearly **CROSS OUT** the problem you do not wish me to grade. Each problem is worth 16 points, and you get 4 points for free, for a total of 100 points. The answers will be posted on the electronic reserves later today.

1. Solve $x^2 y' + \frac{1}{y^2} = 0$ if $y = 2$ when $x = 1$.

2. Find $f'(x)$ for the following functions. DO NOT simplify!

(a) $f(x) = \frac{1+e^x}{1-e^x}$

(b) $f(x) = \ln\sqrt{\frac{2x+3}{x^3-4}}$

3. Suppose that Investment A earns interest at an annual rate of 8% compounded quarterly. Investment B earns interest at an annual rate of 7.8% compounded continuously. Which investment has the higher yield? Show your work.

4. a) Find x if $\log_2 x + 3\log_2 2 = \log_2\left(\frac{2}{x}\right)$

b) Simplify $e^{\ln x} + \ln e^x + 1$

5. For the function $f(x) = xe^{-x}$, list all intervals of increase and decrease, all maximum and minimum *points*, intervals where the function is concave up and concave down, all inflection *points*, and all asymptotes (or say there are none). Then sketch the graph of the function.

6. Evaluate the following integrals:

a) $\int \frac{x^3}{e^{x^4}}\,dx$

b) $\int \frac{x^3 - x + 1}{x^2}\,dx$

7. Solve $\int x^3 \ln x\,dx$