

NAME \_\_\_\_\_

Math 12  
Test 3  
Fall 2012

You have 50 minutes to complete this test. You must *show all work* to receive full credit. Work any 7 of the following 8 problems. Clearly **CROSS OUT** the problem you do not wish me to grade. Each problem is worth 14 points, and you get 2 points for free, for a total of 100 points. The answers will be posted on the electronic reserves later today.

1. Solve  $y' = y^2 e^{3x}$  if  $y = 1$  when  $x = 0$ .

2. Find  $y'$ :

(a)  $y = \sqrt{x \ln(x^2 + 1)}$

(b)  $y = x^2 e^{3x-2}$



5. Solve the following for  $x$ :

a)  $3^{x^2-4x} = \left(\frac{1}{81}\right)^{x-4}$

b)  $\log_3(x-2) + \log_3(x+6) = 2$

c)  $\log_x(2x-3) = 1$

6. Evaluate the following integrals:

a)  $\int \frac{1}{x \ln x} dx$

b)  $\int \frac{2x^2 + x - 5\sqrt{x}}{3x^2} dx$

7. 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.

8. Evaluate  $\int x^3 \ln x \, dx$ .