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

3. Which is the better investment option, (A) an account earning annual interest of 8% compounded quarterly, or (B) an account earning annual interest of 7.5% compounded continuously?

4. A fossil is found to contain 1/6 of its original ${}^{14}C$. The half-life of ${}^{14}C$ is 5730 years. How old is the fossil?

Solve the following for *x*: 5.

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

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

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

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