

NAME _____

Math 12
Test 3
Spring 2012

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 tomorrow.

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

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

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

(b) $f(x) = \ln\left(\frac{e^{2x}}{x^2 + 1}\right)$

3. The undergraduate enrollment at S&T was 5155 in the Fall of 2009. In the Fall of 2011, it was 5501. Assuming enrollment grows exponentially, what is the expected enrollment in Fall 2012?

4. a) Simplify $\log_{25} \frac{1}{125}$.

b) Simplify $2e^{3\ln 2}$.

c) Solve for x : $\ln(3-x) - \ln(2x-1) = \ln 2$.

5. For the function $f(x) = \frac{6}{1+e^{-x}}$, 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, being sure to label appropriately.

6. Evaluate the following integrals:

a) $\int x^3(x^2 - 1)^8 dx$

b) $\int \frac{1}{3x-5} dx$

c) $\int \left(\frac{1}{2x} - \frac{2}{x^2} + \frac{3}{\sqrt{x}} \right) dx$

7. Solve $\int (x+1)(x+2)^6 dx$