

NAME _____

Math 1212
Test 3
Spring 2015

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. Since we are doing Basic Skills tomorrow, exams will be returned on Wednesday.

1. Solve $\frac{dy}{dx} = 4x^3 y^2$ if $y = 2$ when $x = 1$.

2. Evaluate the following.

a) $\int (4x+2)e^{3x^2+3x-1} dx$

b) $\int \frac{1}{x(\ln x)^2} dx$

3. Find all maxima, minima and inflection points of $f(x) = x \ln x$ for $x > 0$. Also give the intervals where f is increasing, decreasing, concave up, and concave down. Find all vertical and horizontal asymptotes, or state that none exist. Then carefully sketch the graph of f .

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

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

(b) $f(x) = \frac{e^{-3x}}{x^2 + 1}$

5. Which account will earn more money, Account A, earning 6% annual interest compounded monthly, or Account B, earning 5.5% interest compounded continuously?
6. A family of rabbits has taken up residence under the azalea in my backyard. Currently there are 5 rabbits, and a month from now there will be 8 rabbits. Assuming that rabbits multiply exponentially, and that I keep my cat indoors, how long will it be until there are 100 rabbits?

7. a) If $5 = 1 + 4e^{-6x}$, solve for x .

b) If $\log_3 x = \frac{1}{3}(\log_3 16 + 2\log_3 2)$, solve for x .

8. Evaluate $\int \frac{\ln 3x}{x^2} dx$.