

NAME \_\_\_\_\_

Math 1212  
Test 3  
Spring 2016

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  $\frac{dy}{dx} = y^2\sqrt{4-x}$  if  $y = 2$  when  $x = 4$ .

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

(a)  $f(x) = \frac{4e^{3x}}{x^2 + 1}$

(b)  $f(x) = \ln\sqrt{3x^2 + 4x - 1}$



5. a) If  $\log_2 x = 2(\log_2 3 - \log_2 5)$ , find  $x$ .

b) If  $\ln a = -1$ ,  $\ln b = 2$ , and  $\ln c = 4$ , calculate  $\ln \frac{a^3}{\sqrt{bc}}$ .

6. Evaluate the following integrals:

a)  $\int (x^2 - 1)(x^3 - 3x)^4 dx$

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

c)  $\int x^2 \ln x dx$

7. Find all maxima, minima and inflection points of  $f(x) = xe^{-x}$ . Also give the intervals where  $f$  is increasing, decreasing, concave up, and concave down. Then carefully sketch the graph of  $f$ , including all asymptotes. Be sure to label the asymptotes, extrema, and inflection points.