

# TEST 2

Math 105  
11/9/12

Name: \_\_\_\_\_

by writing my name I swear this work is my own

**Read all of the following information before starting the exam:**

- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Circle or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point. I will take points off for rambling and for incorrect or irrelevant statements.
- This test has 8 problems and is worth 100 points, It is your responsibility to make sure that you have all of the pages!
- Good luck!

1. (3 points) Solve the following differential equation  $y' = 5y$  with initial condition  $y(0) = R$ .

2. (14 points)

$x$	$f(x)$	$g(x)$	$j(x)$	$f'(x)$	$g'(x)$	$j'(x)$
-2	0	1	-1	3	2	1
-1	1	3	2	-1	3	0
0	2	1	1	2	-2	2
1	3	1	-1	0	3	1
2	-2	2	1	3	0	3
3	-1	1	-1	1	-2	2

a. (7 pts)  $H(x) = f(j(x)) + g(x^2 - 1)$ . Find  $H'(2)$ .

b. (7 pts)  $F(x) = \frac{g(x)^2}{(x+1)j(x)}$ . Find  $F'(0)$ .

3. (20 points) Find  $y'$ .

a. (10 pts)  $y = \frac{\sin^4(x)(3x^4 - 2x + 5)^3 e^{3x}}{(x+1)^2(2x-3)^5}$  using logarithmic differentiation

b. (10 pts)  $y = \sqrt[4]{\tan^2(2x+1)} + 2^{\cos(3x)} - \arcsin(3x^2)$

4. (11 points)

a. (9 pts) For the equation  $\sin(xy^2) = 3x^2 + 3y^3 - 3$  use implicit differentiation to find  $\frac{dy}{dx}$ .

b. (2 pts) Determine  $\frac{dy}{dx}$  at the point (0,1).

5. (18 points) Find the antiderivative of the given function.

a. (6 pts)  $h(x) = x^3 - e^{6x} + 4\cos(x) - \frac{4}{x}$ .

b. (6 pts)  $f(x) = \frac{2}{4 + x^2}$ .

c. (6 pts)  $g(x) = \frac{2x}{4 + x^2}$ .

**6.** (16 points) Evaluate the following limits. Only use L'Hôpital's rule when appropriate. Show your work!!

a. (8 pts)  $\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x}$

b. (8 pts)  $\lim_{x \rightarrow \infty} \left(1 + \frac{k}{x}\right)^x$ , for  $k$  a constant.

**7.** (3 points) Does  $f(x) = \frac{5x^3 + 6x - 1}{2x^3 + 10}$  have a horizontal asymptote? If so, where is it?

8. (15 points) A farmer wishes to build a corral for his cows in the shape below (rectangle with semi-circles on the ends). She has 1000ft of fencing and she won't fence-in the straight edge along the water (just bolded sides). What is the maximal area for the corral?

WATER

