

SAN JOSÉ STATE UNIVERSITY

Math 133A, Fall 2004

# Sample Final Exam

Name:

	Score
1	
2	
3	
4	
5	
6	
Total	

EXPLAIN YOUR ANSWERS

1. Solve the following initial value problem:

$$y' = (1 + y^2) \tan x, \quad y(0) = \sqrt{3}.$$

**Solution:**

2. Consider the equation

$$(y^2 + 2xy)dx - x^2dy = 0.$$

- (a) Show that the equation is not exact.
- (b) Find an  $n$  such that multiplying both sides of the equation by  $y^n$  yields an exact equation.
- (c) Use the solution to the resulting exact equation to solve the original equation.
- (d) Were any solutions lost in the process?

**Solution:**

3. Determine the form of a particular solution  $y_p$  to the given ODE, but do **not** solve for  $y_p$ :

$$y'' - 4y' + 5y = 1 + e^{5t} + te^{2t} \sin t - \cos 3t.$$

**Solution:**

4. Find the general solution to

$$y'' + 4y' + 4y = e^{-2t} \log t.$$

**Solution:**

5. Determine the inverse Laplace transform of the function  $F$ , where

$$sF(s) - F(s) = e^{-s} \frac{2s + 5}{s^2 + 2s + 1}.$$

**Solution:**

6. Solve the initial value problem

$$y'' + 5y' + 6y = tu(t - 2), \quad y(0) = 0, \quad y'(0) = 1.$$

**Solution:**