

Name: \_\_\_\_\_ ID Number: \_\_\_\_\_

TA: \_\_\_\_\_ Section Time: \_\_\_\_\_

Math 20D

Exam 1.

April 23, 2008

*No calculators or any other devices are allowed on this exam.*

*Read each question carefully. If any question is not clear, ask for clarification.*

*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

*Answer each question completely, and show all your work.*

1. (20 points) Find the solution  $y(t)$  to the initial value problem

$$t y' + (1 + t) y = 3, \quad y(1) = 0.$$

#	Score
1	
2	
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2. (a) (15 points) Compute an *implicit* expression for the solution  $y(t)$  to the initial value problem

$$y' = \frac{e^{2t} - e^{-2t}}{4 + 3y}, \quad y(0) = 0.$$

- (b) (5 points) Find the *explicit* expression for the solution found in part (2a).

3. (30 points) Find all solutions  $y(x)$  of the differential equation

$$\left(\frac{5y^3}{x^2} + \frac{3}{x}\right)y' + \frac{3y}{x^2} + 5x = 0.$$

You can leave the solution  $y(x)$  expressed in implicit form.

4. (a) (10 points) Find the general solution  $y(t)$  of the differential equation:

$$y'' + 2y' - 3y = 0.$$

- (b) (10 points) Find the particular solutions  $y_1(t)$  and  $y_2(t)$  of the differential equation given in part (4a) corresponding to the initial conditions:

$$y_1(0) = 1, \quad y_1'(0) = 0, \quad \text{and} \quad y_2(0) = 0, \quad y_2'(0) = 1.$$

- (c) (10 points) Are the solutions  $y_1(t)$  and  $y_2(t)$  found in part (4b) linearly independent or linearly dependent? Justify your answer, and show your work.