Name:_____

Recitation:_____

Math 240
Exam 1
Sept. 20, 2005

Problem	Score
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Closed book. You may use a calculator and one 8 ½ × 11" sheet of handwritten notes (both sides). You must show your work to receive full credit. Write solutions in explicit form if possible. Remember that a general solution is a solution with as many arbitrary constants as the order of the equation (and these are all first order equations). All problems have a solution that can be found using the techniques of this class. Problems that ask for answers in paragraph form will be graded on both content and clarity. Points may be deducted for errors in spelling and grammar.

Pledge:
On my honor, as a student, I have neither given nor received unauthorized aid on this examination: _____ _____

(signature) (date)

Name:_____

1. Find all solutions to $\dfrac{dy}{dx} = \dfrac{5x+y}{3y-x}$.

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2. Solve the initial value problem $\dfrac{dy}{dx} = y + e^x y^2, \quad y(0) = 1.$

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3. Solve the initial value problem, $\dfrac{dy}{dx} = y^2 - 4, \quad y(0) = -2.$

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4. Find $\lim_{t\to\infty} P(t)$ where $P(t)$ is the solution to the initial value problem

$$\frac{dP}{dt} = .4P(2-\ln(P)),\ P(0) = 2.$$

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5. Using the improved Euler method with step size $h = 1$, approximate $y(2)$ if $\frac{dy}{dx} = 2x + y$, $y(0) = 1$.

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6. Find all solutions to

$$\frac{dy}{dx} = x^2 + 2xy + y^2 + 2x + 2y.$$

Hint: Make the substitution $v = x + y$.

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7. Suppose you have a population of 100,000 when sudden habitat destruction reduces the carrying capacity of the environment to 10,000. If the population has a growth rate of .4, how long will it take the population to drop to 20,000?