Name:_____

Recitation:_____

Math 240
Exam 1
Sept. 21, 2010

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. All problems have a solution that can be found using the techniques of this class and all integrals can be evaluated using techniques from Calculus. Problems that ask for answers in paragraph form will be graded on both content and clarity. On such problems 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 $\frac{dy}{dx} - 2y = 3x$.

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2. Find all solutions to $\frac{dy}{dx} = \frac{y^2 + 6xy - 6x^2}{5x^2}$.

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

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

$\frac{dP}{dt} = 0.5P(P-5)$, $P(0) = 2$.

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5. Using the improved Euler method with step size $h = 1$, approximate $y(1)$ if $\frac{dy}{dx} = x + 2y$, $y(0) = 0.5$.

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6. Find all solutions to $\frac{dy}{dx} = y^2 - 4xy + 4x^2 + 3$. Hint: use the substitution $v = y - 2x$.

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7. Suppose you have a population experiencing logistic growth with a growth rate of 20% per year. How long will it take the population to grow from 10% of the carrying capacity to 90% of the carrying capacity?

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8. Two students are asked if the solution to the initial value problem. $\frac{dy}{dx} = 3x^2y^2$, $y(0) = 1$ could ever take a negative value for $x > 0$. Kasey argues that y can't be negative because $3x^2y^2 \geq 0$, so the derivative is always non-negative, hence y is always increasing or flat, and, since we increase from $y = 1$, y must always be positive. On the other hand, Riley solves the problem to get $y = \frac{1}{1-x^3}$, and then computes $y(2) = -\frac{1}{7} < 0$, hence y can be negative. Write a paragraph explaining whether Kasey or Riley (or both or neither) are right. Your paragraph should be written in complete sentences and may include equations and/or make reference to diagrams you draw. The paragraph will be graded on correctness (whether you pick the correct explanation or explanations), completeness (whether you explain why any incorrect explanations are wrong, or, if both are correct, how you resolve the contradiction between them), and clarity (whether the grader has difficulty understanding what you write). Failure to use proper grammar and spelling will reduce the clarity of your answer.

Name:_____