

Name: _____
Exam III
November 22, 2005

Math 222
Lecture 2
Shirin Malekpour

CHECK YOUR TA'S NAME:

<input type="checkbox"/> JAY HEUMANN	<input type="checkbox"/> EKIN OZMAN
<input type="checkbox"/> LOIZOS SOLOMOU	<input type="checkbox"/> MIKE ROSE

I	24 Points	
II	18 Points	
III	18 Points	
IV	15 Points	
V	25 Points	
Total	100 Points	

WRITE YOUR NAME AND CHECK YOUR TA'S NAME ON EVERY ANSWER SHEET.
SHOW YOUR REASONING. YOU NEED TO SHOW WORK TO GET FULL CREDIT. NO CALCULATORS ARE ALLOWED. LEAVE YOUR ANSWERS IN FORM OF $\sqrt{2} + \pi^3$, $\ln(2)$, ETC.

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I. (24 points.)

(A) Let $y' + (3x^2 + e^{x^2-1})y = x^3$ and $y(1) = \frac{-1}{4}$ be given. Find the slope of the tangent line to the graph of the solution of the initial value problem at the point $(1, \frac{-1}{4})$.

(B) Solve the differential equation $(x + 1)y' + 2y = (x + 1)^4$.

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II. (18 points.) Solve the following differential equations:

(a) $y'' - 2y' - 3y = 0$

(b) $y'' - 2y' - 3y = 16e^{3x}$

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III. (18 points.) Determine the rotation angle θ needed to eliminate the crossproduct term in $x^2 + 4xy + y^2 = 10$. Identify the resulting conic and find the distance between the two foci.

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IV. (15 points.)

(A) Determine if $r = 3 \sin(2\theta)$ is symmetric with respect to the x -axis, the y -axis and the origin.

(B) Sketch a graph of $r = 3 \sin(2\theta)$.

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V. (25 points.) Find the area of the shaded part of the graph. Set up the integral, but do not evaluate it. ($0 < k \leq 2$).

