MATH 361 Final Exam Fall 2011

	Name:
1.	Solve the initial value problem: $x^3y' + 4x^2y = 2e^{-x}, \;\; y(-1) = 1$ Ans:_____.
2.	Solve the differential equation $\sqrt{1+x^2}y' - xy^3 = 0, \;\; y(0) = 1,$ Ans:_____.
3.	A boy scout boils soup in a camp site where the temperature is 15^oC. After 2 minutes, the soup is at 80^oC. What is the temperature of the soup after 5 minutes? Ans:_____.
	(Extra Space)

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4.	Let $\frac{dx}{dt} = x^3 - 9x$, Graph qualitative solutions for $x(0) = -2, 1, 4$. Classify the equilibrium solutions and determine the inflection points.
5.	a) Solve the equation: $2y'' + 2y' + y = 0$ Ans:_____. b) Solve the equation: $y^{iv} - y = 0$
6.	Find the general solution of $4y'' + y = 2\sec(x/2)$ Ans:_____.
	(Extra Space)

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7.	Let $(t-1)y'' - ty' + y = 0$. Find the general solution, given that $y_1 = e^t$ is a solution. Ans:_____.
8.	a) Solve the equation: $x^2y'' + 3xy' + 5y = 0$ Ans:_____. b) Find the radius of convergence of the series solution of $(x^2+4)y'' + y = 0$, about $x = 1$. Ans:_____.
9.	Solve by Laplace Transforms a) $y'' - 2y' + 2y = e^{-t},\ y(0) = 0, y'(0) = 1$ Ans:_____. b) $y'' + 4y' + 8y = \delta(t-1),\ \ y(0) = 0,\ y'(0) = 0$ Ans:_____.

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10.	Find the first four non zero terms of a series solution of the equation: $2xy'' + y' + xy = 0$. (Use the largest root of the indicial equation!) Ans:_____.
	Extra space