

MATH 234 - WINTER QUARTER 2012

ODE-PALOOZA!!!!

Do the following problems on your own paper. You must show your work to get credit for your answers.

1. Solve the following problems. If initial conditions are given, solve the initial value problem. If no initial conditions are given, find the general solution. *If you choose series methods, please find the first three non-zero terms in the sum.*

(a) $2y'' + 4y' + 2y = xe^x$

(h) $y'' + 2y' + y = 0$

(b) $x^2y'' + xy' + y = 0$

(i) $\vec{y} = \begin{bmatrix} 1 & 2 & 4 \\ 0 & 3 & 3 \\ 0 & 0 & -1 \end{bmatrix} \vec{y}$

(c) $2x + y^2 + 2xyy' = 0$

(j) $(4 - x^2)y'' + y = 0$ near $x = 0$

(d) $y'(t) = y(t) + 4z(t) + e^t$
 $z'(t) = 5z(t) - y(t)$

(k) $(1 + x^2)y' + 4xy - \frac{1}{1 + x^2} = 0$

(e) $\frac{dz}{dt} = z^2 \sin(t)$

(l) $-(x^2 + 2xy)\frac{dy}{dx} = 2xy + y^2 + 1$

(f) $y' = y \cos(x) + y - 1$

(m) $y'' + 8y' + 16y = 3xe^{-4x} + x$

(g) $y'' - y = \cos(t) - u_\pi(t) \cos(t - \pi)$

(n) $y''' + 2y'' + y' = 0$