Maple # 2
Rensselaer Polytechnic Institute
Department of Mathematical Sciences
Maple # 2 Project Spring 06 due Friday April 7

(In each of the following problems use Maple commands for all operations)

1 / Solve the IVP and plot the solution in the interval [0.1,40]

\[ t^2 y'' + ty' + (t^2 - 0.25)y = (2t)^{1.5}/\pi, \quad y(2\pi) = 0, \quad y'(2\pi) = 0 \]

2 / Using the “laplace” command, solve the IVP and plot the solution in the interval [0,60].

\[ y'' + 0.1 y' + y = \text{Dirac}(t - 4\pi), \quad y(0) = 0, \quad y'(0) = 0 \]

3 / Let \( A = \begin{pmatrix} -1.01 & -20.1 \\ 0.1 & 1 \end{pmatrix} \)

Solve the system \( X' = AX, \quad X(0) = \begin{pmatrix} 0 \\ 1 \end{pmatrix} \) and plot the solution in [0, 8\pi]

4 / Let \( A = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \\ -8 & -5 & -3 \end{pmatrix} \)

a) Find the eigenvalues of \( A \)

b) Find the corresponding eigenvectors

c) Solve the system \( X' = AX, \quad X(0) = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \)