CMSC/AMSC 460 Fall 2007
Homework 5
Due Tuesday, November 13, before class begins
10 points

The assignment provides a little practice in solving linear systems of equations and systems of ODEs. We'll use these techniques again in Hmwk. 7.

Use `ode45` to solve the differential equation

$$\mathbf{y}' = \mathbf{J}^{-1}\mathbf{y} - \mathbf{y},$$

over the interval $t = 0$ to $t = 10$ with

$$\mathbf{y}(0) = \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix},$$

$$\mathbf{J}(t) = \begin{bmatrix} 1+t & t^2 y_2(t) & t y_3(t) \\ t y_1(t) & 1+t & t^2 y_3(t) \\ t^2 y_1(t) & t y_2(t) & 1+t \end{bmatrix}.$$

Plot the three components of $\mathbf{y}$ on a single graph, with labeled axes and a legend to distinguish the three components.

Use `Events` to find the time $t$ when $y_3(t) = 1$.

Your programs should be well documented.

Hints: Helpful Matlab commands include `ode45`, `plot`, `legend`, `xlabel`, `ylabel`, `title`, `odeset`.

Examples of using `ode45` and `events`: http://www.mathworks.com/access/
helpdesk/help/techdoc/index.html?/access/helpdesk/help/techdoc/math/
f1-662913.html
http://www.mathworks.com/access/helpdesk/help/techdoc/math/f1-662913.
html#f1-669698