# MATH 320, Spring 2013, Assignment 12
## Textbook Questions

**Section 7.1** Transform the given differential equation or system into an equivalent system of first-order differential equations.

**# 2.** $x^{(4)} + 6x'' - 3x' + x = \cos 3t$

**# 7.** $x'' = -\dfrac{kx}{(x^2 + y^2)^{3/2}}, y'' = -\dfrac{ky}{(x^2 + y^2)^{3/2}}$

**Section 7.3** Apply the eigenvalue method to find a general solution of the given system.

**# 5.** $x_1' = 6x_1 - 7x_2, \quad x_2' = x_1 - 2x_2$

**# 12.** $x_1' = x_1 - 5x_2, \quad x_2' = x_1 + 3x_2$

**# 24.** $x_1' = 2x_1 + x_2 - x_3, \quad x_2' = -4x_1 - 3x_2 - x_3, \quad x_3' = 4x_1 + 4x_2 + 2x_3$

**Section 7.5** Find general solutions of the following systems.

**# 4.**
$$\vec{x}' = \begin{bmatrix} 3 & -1 \\ 1 & 5 \end{bmatrix} \vec{x}$$

**# 11.**
$$\vec{x}' = \begin{bmatrix} -3 & 0 & -4 \\ -1 & -1 & -1 \\ 1 & 0 & 1 \end{bmatrix} \vec{x}$$

**# 18.**
$$\vec{x}' = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 3 & 1 \\ -2 & -4 & -1 \end{bmatrix} \vec{x}$$

Find a general solution of the indicated system $\vec{x}' = A\vec{x}$ given the indicated eigenvalues.

**# 23.**
$$\vec{x}' = \begin{bmatrix} 39 & 8 & -16 \\ -36 & -5 & 16 \\ 72 & 16 & -29 \end{bmatrix} \vec{x}, \quad \lambda = -1, 3, 3$$