MATH 319, Fall 2013, Assignment 10
Textbook Questions

Section 7.1, **#3** Transform the following equation into a system of first order equations:

$$t^2 u'' + t u' + (t^2 - 0.25)u = 0$$

#4 Transform the following equation into a system of first order equations:

$$u^{(4)} - u = 0$$

Section 7.2, #6(a) and (c) Consider the matrices

$$A = \begin{bmatrix} 1 & -2 & 0 \\ 3 & 2 & -1 \\ -2 & 0 & 3 \end{bmatrix}, B = \begin{bmatrix} 2 & 1 & -1 \\ -2 & 3 & 3 \\ 1 & 0 & 2 \end{bmatrix}, \text{ and } C = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 2 \\ 0 & 1 & -1 \end{bmatrix}.$$

Verify that (a) $(AB)C = A(BC)$ and (c) $A(B + C) = AB + AC$.

#24 Verify that the given vector satisfies the given differential equation.

$$\mathbf{x}' = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 0 & -1 & 1 \end{bmatrix} \mathbf{x}, \quad \mathbf{x} = \begin{bmatrix} 6 \\ -8 \\ -4 \end{bmatrix} e^{-t} + 2 \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix} e^{2t}$$

Section 7.3, #17 Determine the eigenvalues and eigenvectors of

$$A = \begin{bmatrix} 3 & -2 \\ 4 & -1 \end{bmatrix}$$

#20 Determine the eigenvalues and eigenvectors of

$$B = \begin{bmatrix} 1 & \sqrt{3} \\ \sqrt{3} & -1 \end{bmatrix}$$