MATH 308 – 518, 519, 520 Homework 10 Spring 2014

Due Tuesday, April 22 at the beginning of class.

1. Transform the given equation/initial value problem into a system of first order equations.
   (a) $y'' + 0.5y' + 2y = 3\sin t$
   (b) $y'' + 0.25y' + 4y = 2\cos 3t$, $y(0) = 1$, $y'(0) = -2$.
2. If $A = \begin{pmatrix} 1+i & -1+2i \\ 3+2i & 2-i \end{pmatrix}$ and $B = \begin{pmatrix} i & 3 \\ 2 & 2i \end{pmatrix}$, find
   (a) $3A - 2B$
   (b) AB
   (c) BA
3. If $A = \begin{pmatrix} 1 & 4 \\ -2 & 3 \end{pmatrix}$, find A^{-1}.
4. Find eigenvalues and eigenvectors of the matrix $A = \begin{pmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{pmatrix}$.
5. Find general solutions of the given system
   (a) $\mathbf{x}' = \begin{pmatrix} 1 & -2 \\ 3 & -4 \end{pmatrix} \mathbf{x}$
   (b) $\mathbf{x}' = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} \mathbf{x}$
   (c) $\mathbf{x}' = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix} \mathbf{x}$