HOMEWORK 8-PART A+B+C

1.Write each initial problem in the follwing as a system of 1st-order equations using vector notations:
(1) $y^{''} + 2y^{'} + 4y = 3cos2t, y(0) = 1, y^{'}(0) = 0.$

(2) $w^{'''} + w = 0, w(0) = w_0, w^{'}(0) = \alpha_0, w^{''}(0) = \gamma_0.$

(3) $mx^{''} = \mu x^{'} + kx = F_0 coswt, x(0) = x_0, x^{'}(0) = v_0.$

2. Find the eigenvalues for the following matrices.(If you could not solve roots for a polynomial, can use computer)
(1) $\begin{pmatrix} 2 & 0 & 1 \\ -3 & -1 & -1 \\ -2 & 0 & 5 \end{pmatrix}$
(2) $\begin{pmatrix} -6 & -13 & -11 \\ 4 & 1 & 1 \\ -4 & 2 & 2 \end{pmatrix}$
(3) $\begin{pmatrix} -2 & -3 & 1 & 1 \\ -4 & -5 & 0 & 4 \\ 7 & 9 & -4 & -9 \\ -7 & -9 & 1 & 6 \end{pmatrix}$.

3. Find the eigenvectors for the matrix $A = \begin{pmatrix} -1 & 2 \\ -4 & 5 \end{pmatrix}$.