**QUIZ NO: 5** Name:_____ ID:_____ Section_____

Q1 Find solutions of the IVP for he system $\frac{dX}{dt} = \begin{pmatrix} -2 & 1 \\ -1 & -4 \end{pmatrix} X$ when $X_o = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$.

Q2.The three Eigenvectors of a 3x3 matrix $A$ are given by $V_1 = \begin{pmatrix} -2 \\ -2 \\ 2 \end{pmatrix}$, $V_2 = \begin{pmatrix} 2 \\ -5 \\ 1 \end{pmatrix}$ and $V_3 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$.

(a): Construct a Q matrix with these three Eigen-Vectors.

(b): Use the Q matrix to find a diagonal matrix.

(c): From the diagonal matrix find the Eigen-Value of the 3x3 matrix A.

Q3. A matrix has a defective Eigen-Value of multiplicity 5. Assume that the defect is 2 such that you get three usual eigenvectors $V_1; V_2; V_3$ and two generalized eigenvectors $V_{1g}; and\ V_{2g}$ . Assume that you construct the Q matrix as $Q = \left(V_1 \vdots V_2 \vdots V_3 \vdots \quad V_{1g} \vdots \quad V_{2g}\right)$. Without calculations, write the $J$ matrix.