MTH 480/Peszynska. Snow day credit
(5 points to be added to Midterm score). Due Friday February 14

NAME:

Please show all relevant work to get full credit.

Let $A = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$. It can be shown that A is similar to $\Lambda = \begin{pmatrix} 2 & 1 \\ -1 & 2 \end{pmatrix}$.

(1) What is the solution to $Y' = \Lambda Y, Y(0) = (0,0)^T$? ?

(2) What is the solution to $X' = AX, X(0) = (0,0)^T$? ?

(3) What are the eigenvalues of Λ ? (you should be able to read them off Λ)

(4) What are the eigenvalues of A ? (no surprises here since Λ is similar to A)

(5) What are the eigenvectors w of Λ ? (since Λ is in canonical form, these are fairly simple.)
Write $w =$
Write them as $w = Rew + iImw =$

(6) What are the eigenvectors v of A ? (some work is needed this time).
Write them here $v =$
Write them as $v = Rev + iImv =$

(7) Consider $Y' = \Lambda Y$ and, starting with the general complex valued solution, describe in detail how to derive the general real valued solutions to $Y' = \Lambda Y$. (Use w and eigenvalues of Λ here, Euler formula etc.)

(8) Find the transformation T which gives $A = T\Lambda T^{-1}$. (Use v)

(9) Write the general real valued solution to $X' = AX$.

(10) Now apply all the above to finf the solution to $X' = AX, X(0) = (0,1)^T$. (On opposite side).