HOMEWORK 13-PART B

1. Use the fact that $\begin{pmatrix} cost & -sint \\ sint & cost \end{pmatrix} = e^{\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}}$ to show that if $A = \begin{pmatrix} a & -b \\ b & a \end{pmatrix}$, then $e^{tA} = e^{at} \begin{pmatrix} cos\ bt & -sin\ bt \\ sin\ bt & cos\ bt \end{pmatrix}$. Hint: $A = aI + b \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

2.(1)Show that if $(A - 4I)v = 0$, then $e^A v = e^4 v$.

(2) Show that if $(A + 2I)v = 0$, then $e^A v = e^{-2} v$.

3. (1) For $A = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$, calculate e^A.

(2) Use result in (1) to calculate $e^{\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}}$. Hint: $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} = I + A$.