

MA511 HW31 Sol.

#5.4.8

Sol. (a)  $A = \begin{bmatrix} 4 & -2 \\ 1 & 1 \end{bmatrix}$

$$\lambda_1 = 3$$

$$\chi_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

$$\lambda_2 = 2$$

$$\chi_2 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

unstable

$$(b) u = \begin{bmatrix} r \\ w \end{bmatrix} = 100e^{3t} \begin{bmatrix} 2 \\ 1 \end{bmatrix} + 100e^{2t} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

(c) Ratio approaches 2/1

#5.4.10

Sol. Unstable

$$\begin{bmatrix} v \\ w \end{bmatrix} = c_1 e^t \begin{bmatrix} 1 \\ 1 \end{bmatrix} + c_2 e^{-t} \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

If  $c_1 = 0$ , the solution decays.