8.2.2.

$$\begin{cases} \dfrac{dx}{dt} = 2x + 2y \\ \dfrac{dy}{dt} = x + 3y \end{cases} \qquad \begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$0 = \begin{vmatrix} 2-\lambda & 2 \\ 1 & 3-\lambda \end{vmatrix} = (2-\lambda)(3-\lambda) - 2 = \lambda^2 - 5\lambda + 4$$

$$(\lambda - 1)(\lambda - 4) = 0$$

$$\lambda_1 = 1 , \ \lambda_2 = 4$$

Bestäm en egenvektor till varje egenvärde .

Insättning i $(\mathbf{A}-\lambda\mathbf{I})\mathbf{v}=\mathbf{0}$ ger:

$\lambda_1 = 1$

$$\begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix}\mathbf{v}_1 = \mathbf{0}$$

$$\mathbf{v}_1 = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$$

$\lambda_2 = 4$

$$\begin{pmatrix} -2 & 2 \\ 1 & -1 \end{pmatrix}\mathbf{v}_2 = \mathbf{0}$$

$$\mathbf{v}_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\mathbf{X} = c_1\begin{pmatrix} 2 \\ -1 \end{pmatrix}e^{t} + c_2\begin{pmatrix} 1 \\ 1 \end{pmatrix}e^{4t}$$