$$\dot{x} = \lambda x \Rightarrow x(t) = Ce^{\lambda t}$$

$$\frac{d\,x(t)}{dt} = \frac{d}{dt}\left(Ce^{\lambda t}\right) = C\frac{d}{dt}\left(e^{\lambda t}\right) = C\frac{de^{\lambda t}}{d(\lambda t)} \cdot \frac{d\lambda t}{dt}$$

$$= Ce^{\lambda t}\lambda = \lambda C e^{\lambda t} = \lambda x(t).$$

$$x(0) = C_0 \Rightarrow Ce^{\lambda 0} = C_0 \Rightarrow Ce^{0} = C_0 \Rightarrow C = C_0.$$

$\Rightarrow y(t) = C_0 e^{\lambda t}$ es sol. part. a $\dot{y} = \lambda y$, $y(0) = C_0$.

continúa

↓

$$\det(A-\lambda I_{2\times 2}) = 0 \Rightarrow \begin{vmatrix} 1-\lambda & 2 \\ 3 & 2-\lambda \end{vmatrix} = (1-\lambda)(2-\lambda) - 6 = 0$$

$$\Rightarrow \lambda^2 - 3\lambda - 4 = 0$$

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

$$\Rightarrow \lambda_1 = 4, \quad \lambda_2 = -1.$$

$$\begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix}\begin{pmatrix} 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 8 \\ 12 \end{pmatrix} = 4\begin{pmatrix} 2 \\ 3 \end{pmatrix} \qquad \begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix}\begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} = -1\begin{pmatrix} -1 \\ 1 \end{pmatrix} \quad \checkmark$$

$$\begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix} = [T]_\beta \qquad \beta = ¿? \qquad \begin{pmatrix} 2 \\ 3 \end{pmatrix} = [\vec{v}_1]_\beta \qquad \begin{pmatrix} -1 \\ 1 \end{pmatrix} = [\vec{v}_2]_\beta$$

Sea $\gamma = (\vec{v}_1, \vec{v}_2)$. Recordemos que

$$[I]_\gamma^\beta = \left([\vec{v}_1]_\beta \;\; [\vec{v}_2]_\beta \right) = \begin{pmatrix} 2 & -1 \\ 3 & 1 \end{pmatrix} \quad \text{y} \quad [I]_\beta^\gamma = \begin{pmatrix} 2 & -1 \\ 3 & 1 \end{pmatrix}^{-1},$$

$$[I]_\beta^\gamma [T]_\beta [I]_\gamma^\beta = [T]_\gamma = \begin{pmatrix} 4 & 0 \\ 0 & -1 \end{pmatrix}.$$

$$\mathbf{Y} = [I]_\beta^\gamma [\vec{x}]_\beta = [\vec{x}]_\gamma = \begin{pmatrix} y_1 \\ y_2 \end{pmatrix}$$

$$[T]_\gamma [\vec{x}]_\gamma = [T(\vec{x})]_\gamma$$

$$\dot{\mathbf{Y}} = [\dot{\vec{x}}]_\gamma$$

Después de haber resuelto el sistema representándolo en γ,

$$[\vec{x}]_\beta = [I]_\gamma^\beta [\vec{x}]_\gamma.$$