$A \Rightarrow |A|$

$B \Rightarrow |B|$

$A+B \Rightarrow |A+B|$

$A \times B \Rightarrow |A \times B|$

with(linalg)

ÁLGEBRA LINEAL

evalm(A &* B)

Valores propios

$$\det(A-\lambda I)=0$$

V.P.A.

$$(A-\lambda I)=\begin{bmatrix}1 & 2\\ -1 & 3\end{bmatrix}-\lambda\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$$

$$=\begin{bmatrix}1-\lambda & 2\\ -1 & 3-\lambda\end{bmatrix}$$

$$\det(A-\lambda I)=0$$

$$\begin{vmatrix}1-\lambda & 2\\ -1 & 3-\lambda\end{vmatrix}=0$$

$$(1-\lambda)(3-\lambda)-(-1)(2)=0$$

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

$$\lambda^2-4\lambda+5=0$$

$$(\lambda-a)(\lambda-b)=0$$

$$\lambda_{1,2}=\frac{-(-4)\pm\sqrt{16-4(5)}}{2}$$

$$\lambda_{1,2}=\frac{4\pm\sqrt{-4}}{2}$$

$$\lambda_{1,2}=\frac{4\pm 2i}{2}$$

$$\boxed{\lambda_{1,2}=2\pm i}$$

with(DEtools)

Ecuaciones diferenciales ordinarias.

with(plots)

with(inttrans)

with(PDEtools).

Método del Factor Integrante.

$SolGral := x^5 y^2 + 8x^3 y^3 - 6x^2 y = C$

SG $x^5y^2 + 8x^3y^3 - 6x^2y = C.$ ←

$$\underbrace{\left(5x^4y^2 + 24x^2y^3 - 12xy\right)}_{M(x,y)} + \underbrace{\left(2x^5y + 24x^3y^2 - 6x^2\right)}_{N(x,y)}\frac{dy}{dx} = 0$$

*

$$x\left(5x^3y^2 + 24xy^3 - 12y\right) + x\left(2x^4y + 24x^2y^2 - 6x\right)\frac{dy}{dx} = 0$$

$$\boxed{\underbrace{\left(5x^3y^2 + 24xy^3 - 12y\right)}_{MM} + \underbrace{\left(2x^4y + 24x^2y^2 - 6x\right)}_{NN}\frac{dy}{dx} = 0}$$

EDO(1)NL.

$$\frac{\partial MM}{\partial y} = 10x^3y + 72xy^2 - 12$$

$$\frac{\partial NN}{\partial x} = 8x^3y + 48xy^2 - 6$$

$\boxed{\text{NO ES EXACTA.}}$

$$M(x,y) + N(x,y)\frac{dy}{dx} = 0$$

EDO(1) NL

$$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x} \quad \text{NO ES EXACTA.}$$

$$\mu(x,y) \Leftarrow \text{FACTOR INTEGRANTE}$$

$$\mu(x,y)\,M(x,y) + \mu(x,y)\,N(x,y)\cdot\frac{dy}{dx} = 0$$

$$\frac{\partial}{\partial y}(\mu \cdot M) = \frac{\partial}{\partial x}(\mu N)$$

$$\frac{\partial}{\partial y}\mu \cdot M + \mu\frac{\partial}{\partial y}M = \frac{\partial}{\partial x}\mu \cdot N + \mu \cdot \frac{\partial}{\partial x}(N)$$

$$\mu\frac{\partial}{\partial y}M - \mu\frac{\partial}{\partial x}N = \frac{\partial}{\partial x}\mu \cdot N - \frac{\partial}{\partial y}\mu \cdot M$$

$$\mu\left(\frac{\partial}{\partial y}M - \frac{\partial}{\partial x}N\right) = \frac{\partial}{\partial x}\mu \cdot N - \frac{\partial}{\partial y}\mu \cdot M$$

Si $\mu(x)$

$$\mu(x)\cdot\left(\frac{\partial}{\partial y}M - \frac{\partial}{\partial x}N\right) = \frac{d}{dx}\mu \cdot N$$

EDO(1) NL

$$\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right) = \frac{\frac{d\mu}{dx}}{\mu}\cdot N$$

$$\left(\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right) = \frac{\frac{d\mu}{dx}}{\mu}$$

$$\frac{d\mu}{\mu} = \left(\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right)dx$$

$$\boxed{\underbrace{(5x^3y^2+24xy^2-12y)}_{MM}+\underbrace{(2x^4y+24x^2y^2-6x)}_{NN}\frac{dy}{dx}=0}$$

EDO(1)NL.

$$\frac{\partial MM}{\partial y}=6x^3y+72xy^2-12$$

$$\frac{\partial NN}{\partial x}=8x^3y+48xy^2-6$$

$$\frac{d\mu}{\mu}=\left(\frac{\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}}{N}\right)dx$$

$$\frac{d\mu}{\mu}=\frac{(10x^3y+72xy^2-12-8x^3y-48xy^2+6)}{2x^4y+24x^2y^2-6x}$$

$$\frac{d\mu}{\mu}=\frac{2x^3y+24xy^2-6}{2x^4y+24x^2y^2-6x}\,dx$$

$$=\frac{1}{x}\left(\frac{\cancel{2x^3y+24xy^2-6}}{\cancel{2x^3y+24xy^2-6}}\right)dx$$

$$\int\frac{d\mu}{\mu}=\int\frac{dx}{x}\Rightarrow L\mu=Lx+LC$$

$$L\mu=LCx$$

$$\mu=Cx \quad \boxed{C=1}$$

$$\boxed{\mu=x}$$

$$(2xy^2 - 3y^3) + (7 - 3xy^2)\frac{dy}{dx} = 0$$

$$\frac{\partial M}{\partial y} = 4xy - 9y^2$$

$$\frac{\partial N}{\partial x} = -3y^2$$

$$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$$