$$\frac{d}{dt}\bar{x} = A\bar{x}$$

$$= e^{At}\,\bar{x}(0)$$

$$L\left\{\frac{d}{dt}\bar{x}\right\} = L\{A x\}$$

$$sL\{\bar{x}\} - \bar{x}(0) = AL\{\bar{x}\}$$

$$sL\{\bar{x}\} - AL\{\bar{x}\} = \bar{x}(0)$$

$$(sI - A)\,L\{\bar{x}\} = \bar{x}(0)$$

$$L\{\bar{x}\} = (sI - A)^{-1}\,\bar{x}(0)$$

$$\bar{x} = L^{-1}\{(sI - A)^{-1}\}\,\bar{x}(0)$$

$$e^{At} = L^{-1}\{(sI - A)^{-1}\}$$

$$A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$$

$$(sI - A) = \begin{bmatrix} s-2 & -3 \\ -1 & s-4 \end{bmatrix}$$

$$(sI - A)^{-1} = \frac{\begin{bmatrix} s-4 & 3 \\ 1 & s-2 \end{bmatrix}}{\begin{vmatrix} s-2 & -3 \\ -1 & s-4 \end{vmatrix}} \Rightarrow \frac{1}{(s-2)(s-4)-3} \begin{bmatrix} s-4 & 3 \\ 1 & s-2 \end{bmatrix}$$

$$(sI - A)^{-1} = \begin{bmatrix} \frac{s-4}{s^2-6s+5} & \frac{3}{s^2-6s+5} \\ \frac{1}{s^2-6s+5} & \frac{s-2}{s^2-6s+5} \end{bmatrix}$$

$$= \begin{bmatrix} \frac{s-4}{(s-1)(s-5)} & \frac{3}{(s-1)(s-5)} \\ \frac{1}{(s-1)(s-5)} & \frac{s-2}{(s-1)(s-5)} \end{bmatrix}$$

$$= \begin{bmatrix} \frac{A}{s-1} + \frac{B}{s-5} & \frac{C}{s-1} + \frac{D}{s-5} \\ \frac{E}{s-1} + \frac{F}{s-5} & \frac{G}{s-1} + \frac{H}{s-5} \end{bmatrix}$$

$F(x, y, \frac{dy}{dx}, \dots) = 0$ $y(x)$ función incógnita

$\downarrow$

{orden, lineal}   solución

solución general $y(x) = c_1 y_1 + c_2 y_2 + \dots + c_n y_n$

$n \to$ orden

soluciones particulares fundamentales

$$\begin{cases} y_1 = 4e^{2x} + 6x^2 \\ y_2 = 3e^{2x} + 4e^{-2x} + 3x \\ y_3 = -e^{-2x} + 4 + 2x \\ y_4 = 3x^2 + 5x + 6 \end{cases} \quad +$$

$$y_n = 7e^{2x} + 3e^{-2x} + 9x^2 + 10x + 10$$

$$y_g = c_1 e^{2x} + c_2 e^{-2x} + c_3 x^2 + c_4 x + c_5$$

ecuac. caract. $(m-2)(m+2)m^3 = 0$

$$(m^2 - 4)m^3 = 0$$

$$m^5 - 4m^3 = 0$$

$$\frac{d^5y}{dx^5} - 4\frac{d^3y}{dx^3} = 0$$

$$\boxed{\frac{d^5y}{dx^5} = 4\frac{d^3y}{dx^3}}$$

$$y_g = c_1 e^{2x} + c_2 e^{-2x} + c_3 + 10x + 9x^2$$

$$(D-2)x_1 + 4x_2 = 3$$

$$5x_1 + (D-3)x_2 = 8$$

$$\left.\begin{array}{l} \frac{dx_1}{dt} - 2x_1 + 4x_2 = 3 \\ 5x_1 + \frac{dx_2}{dt} - 3x_2 = 8 \end{array}\right\}$$

$$\frac{dx_1}{dt} = x_3 \qquad \frac{d^2x_2}{dt^2} - \frac{d^2x_1}{dt^2} = 8e^{3t}$$

$$\frac{dx_2}{dt} = x_4 \qquad \frac{dx_1}{dt} + 4x_1 - 3x_2 = 0$$

$$\frac{dx_4}{dt} - \frac{dx_3}{dt} = 8e^{3x}$$

1 60/100

$$\frac{d^3y}{dt^3} - \frac{d^2y}{dt^2} + 4\frac{dy}{dt} - 6y = 4e^{2t}$$

$y(0) = 2$
$y'(0) = 4$
$y''(0) = -6$

EDO(3) L CC NH

2 40/100

$$\frac{\partial^2 f(y,x)}{\partial y^2} + x^2\frac{\partial f}{\partial x} = 8f$$

$$\frac{dy}{dx} + p(x)y = q(x)$$

$$\underbrace{\left(p(x)y - q(x)\right)}_{M(x,y)} + \underbrace{\frac{dy}{dx}}_{N} = 0$$