EDO(2)LCC NH.

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a y = Q(x) \qquad Q(x) \neq 0$$

Método del Operador Diferencial

$\frac{dy}{dx}$ Leibnitz

$\dot{y}$ Newton

y'

Dy operador diferencial

propiedades del Operador Diferencial

$y(x)$ $\qquad \frac{dy}{dx} = Dy$

$$D(Dy) = D^2 y$$

$$D^{-1}(Dy) = y$$

$$\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = 0$$

$$D^2 y + a_1 D y + a_2 y = 0$$

$$(D^2 + a_1 D + a_2) y = 0$$

$m^2 + a_1 m + a_2 = 0$

$(m - m_1)(m - m_2) = 0$

$$(D - m_1)(D - m_2) y = 0$$

$$y_g = C_1 e^{m_1 x} + C_2 e^{m_2 x}$$

$$(D - m_2) y_g = C_1 (m_1 e^{m x} - m_2 e^{m x}) + C_2 (\cancel{m_2 e^{m_2 x} - m_2 e^{m_2 x}}) = 0$$

$$y_{gg} = C_1 (m_1 - m_2) e^{m_1 x}$$

$$(D - m_1) y_{gg} = C_1 (m_1 - m_2)(\cancel{m_1 e^{m_1 x} - m_1 e^{m_1 x}}) \; 0$$

$$y = 0$$

	$P(D)$	$f(x)$
	$(D-m)$	$c_1 e^{mx}$
	D D^2 $\vdots$ D^{n+1}	c_1 $c_1 x$ $\vdots$ $c_1 x^n$
	$(D-m)^2$ $\vdots$ $(D-m)^{n+1}$	$c_1 x e^{mx}$ $\vdots$ $c_1 x^n e^{mx}$
	(D^2+b^2)	$\cos(bx)$ $\operatorname{sen}(bx)$
$D^2-2aD+(a^2+b^2)$	$((D-a)^2+b^2)$	$e^{ax}\cos(bx)$ $e^{ax}\operatorname{sen}(bx)$

$$(D^2+9)[\cos(3x)]$$

$$D[-3\operatorname{sen}(3x)]+9\cos(3x)]$$

$$[-9\cos(3x)+9\cos(3x)]$$

$$[0]$$

$$\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 5e^{6x}$$

① resolver hom. asoc.

$$\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 0$$

$$\boxed{\begin{aligned} &(D^2 - 7D + 12)y = 0 \\ &(D-3)(D-4)y = 0 \\ &y_{g/h} = C_1 e^{3x} + C_2 e^{4x} \end{aligned}}$$

$$(D-3)(D-4)y = 5e^{6x}$$

$$(D-3)(D-4)\underbrace{(D-6)}_{A}y = 0$$

$$y = a_1 e^{3x} + a_2 e^{4x} + a_3 e^{6x}$$

$$y_g = C_1 e^{3x} + C_2 e^{4x} + Ae^{6x}$$

$$(D^2 - 7D + 12)y = 5e^{6x}$$

$$(D^2 - 7D + 12)[Ae^{6x}] = 5e^{6x}$$

$$D(6Ae^{6x}) - 7(6Ae^{6x}) + 12Ae^{6x} = 5e^{6x}$$

$$(36Ae^{6x}) - 42Ae^{6x} + 12Ae^{6x} = 5e^{6x}$$

$$(36 - 42 + 12)Ae^{6x} = 5e^{6x}$$

$$6Ae^{6x} = 5e^{6x}$$

$$A = \frac{5}{6}$$

$$\boxed{y = C_1 e^{3x} + C_2 e^{4x} + \frac{5}{6}e^{6x}}$$

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 2e^{2x} + 8x^2$$

1) HA

$$(D^2 - 4D + 4)y = 0$$

$$(D-2)^2 y = 0$$

$$y = C_1 e^{2x} + C_2 x e^{2x}$$

$$(D-2)^2 y = 2e^{2x} + 8x^2$$

$$(D-2)^2 (D-2)(D^3) y = 0$$

$$y = C_1 e^{2x} + C_2 x e^{2x} + C_3 x^2 e^{2x} + C_4 + C_5 x + C_6 x^2$$

$$y = C_1 e^{2x} + C_2 x e^{2x} + A x^2 e^{2x} + B + Dx + Ex^2$$

$$y_{P/Q} = A x^2 e^{2x} + B + Dx + Ex^2$$

$$\frac{d^2y}{dt^2} + 9y = 2\,\text{sen}(3t)$$

H.A. $(D^2+9)y = 0$

$$m^2+9=0 \qquad \begin{array}{l} m_1 = 3i \\ m_2 = -3i \end{array}$$

$$y(t) = C_1\cos(3t) + C_2\,\text{sen}(3t)$$

$$(D^2+9)y = 2\,\text{sen}(3t)$$

$$(D^2+9)\underbrace{(D^2+3^2)}_{A}y = 0$$

$$(D^2+9)^2 y = 0$$

$$y(t) = C_1\cos(3t) + C_2\,\text{sen}(3t) + At\cos(3t) + Bt\,\text{sen}(3t)$$

$$(D^2+9)\left[At\cos(3t) + Bt\,\text{sen}(3t)\right] = 2\,\text{sen}(3t)$$