EDO

orden = está determinado por la derivada de mayor orden.

→ es de 4° orden

$$y_g = c_1 y_1 + c_2 y_2 + c_3 y_3 + c_4 y_4$$

+ soluciones particulares
+ linealmente independientes entre ellas.

fundamentales / esenciales.

$$W \Rightarrow \begin{bmatrix} y_1 & y_2 & y_3 & y_4 \\ y_1' & y_2' & y_3' & y_4' \\ y_1'' & y_2'' & y_3'' & y_4'' \\ y_1''' & y_2''' & y_3''' & y_4''' \end{bmatrix} \qquad |W| \neq 0.$$

$$y_g = C_1 e^{3x} + C_2 + C_3 x$$

$y(0) = 4$

$y'(0) = -2$

$y''(0) = 8$

$$y(0) \Rightarrow 4 = C_1 e^{3(0)} + C_2 + C_3(0)$$

$$\frac{dy}{dx} = 3C_1 e^{3x} + (0) + C_3$$

$$y'(0) \Rightarrow -2 = 3C_1 e^{3(0)} + C_3$$

$$\frac{d^2y}{dx^2} \Rightarrow 9C_1 e^{3(x)} + (0)$$

$$y''(0) \Rightarrow 8 = 9C_1 e^{3(0)}$$

$C_1 + C_2 = 4$

$3C_1 + C_3 = -2$

$9C_1 = 8$

$C_1 = \frac{8}{9}$ $\quad C_2 = 4 - \frac{8}{9}$

$C_3 = -2 - \frac{24}{9}$

$C_2 = \frac{28}{9}$

$C_3 = -\frac{42}{9}$

$$y_p = \frac{8}{9} e^{3x} + \frac{28}{9} - \frac{42}{9} x$$

$$y_g = C_1 e^{2x} + C_2 x e^{2x} + C_3 x^2 + C_4 x + C_5 \quad (1)$$

$C_1 = 1$

$C_2 = 0$

$C_3 = 0$

$C_4 = 0$

$C_5 = 0$

$y_p = e^{2x}$ fundamental

$y_p = x e^{2x}$ fundamental

$y_p = x^2$ fundamental

$y_p = x$ fund

$y_p = 1$ fund

$$y_p = 3e^{2x} + 4xe^{2x}$$

$$y_p = -6x^2 + 8x + 4$$

Lineal

$$F(x, y, y', y'', \ldots, y^{(n)}) = 0$$

$$G(x, y, y', y'', \ldots, y^{(n)}) = Q(x)$$

G es lineal en y (incógnita)

entonces EDO es lineal

$$G(x, y, y', y'', \dots, y^{(n)})$$

$$G(x, \lambda y, (\lambda y)', (\lambda y)'', \dots, (\lambda y)^{(n)}) = \lambda^{n} G(\dots)$$

$y(x)$ $$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 7y - 8e^{3x} + 4\cos(5x) = 0$$

G $$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 7y = \underbrace{8e^{3x} - 4\cos(5x)}_{Q(x)}$$

$$\frac{d^2}{dx^2}(\lambda y) - 5\frac{d}{dx}(\lambda y) + 7(\lambda y) =$$

$$\lambda\frac{d^2y}{dx^2} - 5\lambda\frac{dy}{dx} + 7\lambda y \Rightarrow \lambda\left(\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 7y\right)$$

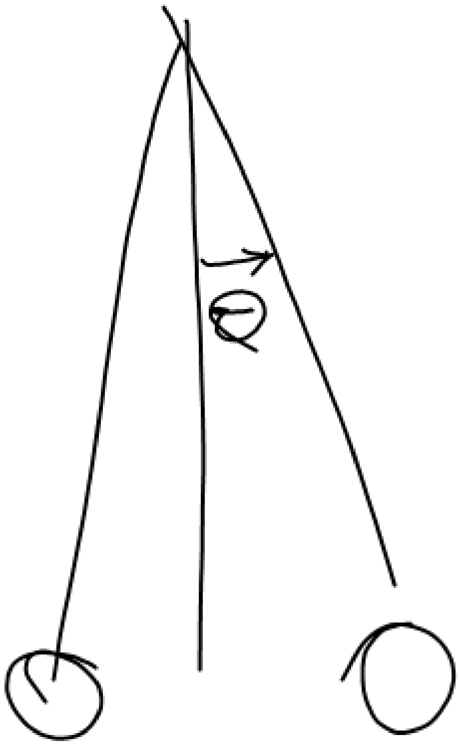
$$\left(\frac{dy}{dx}\right)^2 + y^3 + 8e^x = 0$$

$$\left(\frac{dy}{dx}\right)^2 + y^3 = -8e^x$$

$$\left(\frac{d}{dx}(\lambda y)\right)^2 + (\lambda y)^3 \Rightarrow \lambda^2\left(\frac{dy}{dx}\right)^2 + \lambda^3 y^3$$

$\Rightarrow$ NO LINEAL

$$\frac{d^2\theta}{dt^2} + k \operatorname{sen}(\theta) = 0$$



$\theta < 4°$

$\operatorname{sen}(\theta) \doteq \theta$ en rad.