$$F\left(x, y(x), y'(x)\right) = 0$$

*

función incógnita

Variable independiente.

→ Solución

$\underbrace{\hspace{4cm}}$

General

Particular

Singular

$$\boxed{\frac{d^2y}{dt^2} = -g}$$

EDOL (2) NH.

$$y(t) = -\frac{g}{2}t^2 + C_1 t + C_2$$

SOLUCIÓN GENERAL

$$\frac{dy}{dt} = -gt + C_1 + (0).$$

$$\boxed{\frac{d^2y}{dt^2} = -g + (0)}$$

$$[-g] = -g \Rightarrow 0 = -g + g \Rightarrow \underline{\underline{0 = 0}}$$

ED

- ordinarias I II III
  - $\frac{dy}{dt} \rightarrow y(t)$
  - $y(x)$
  - $x(t)$
  - lineales II III
  - No-Lineales I
- en derivadas parciales IV
  - $\frac{\partial y}{\partial t} \rightarrow y(x,t)$ $z(x,y)$
  - $R = f(x,y,z)$
  - $\gamma = f(x,y,z,t)$.

Lineal

$$a_0(x)\frac{d^n y}{dx^n} + a_1(x)\frac{d^{n-1}y}{dx^{n-1}} + \dots + a_{n-1}(x)\frac{dy}{dx} + a_n(x)y = Q(x).$$

$$-Hx(t) = M\frac{d^2x}{dt^2}$$

$$M\frac{d^2x}{dt^2} + Hx = 0$$

ECUACIÓN DIFERENCIAL ORDINARIA LINEAL 2º ORDEN HOMOGENEA.

$$\boxed{\begin{aligned} a_0(t) &= M \\ a_1(t) &= 0 \\ a_2(t) &= H \\ Q(t) &= 0 \end{aligned}}$$

$$\frac{d^2y}{dt^2} = -g$$

EDOL(2) NH.

$a_0(t) = 1$

$a_1(t) = 0$

$a_2(t) = 0$

$Q(t) = -g$

EDOL(1) NH.

$$\frac{dx}{dt} = V_0\cos\left(\frac{\pi}{4}\right)$$

$a_0(t) = 1$

$a_1(t) = 0$

$Q(t) = V_0\cos\left(\frac{\pi}{4}\right).$

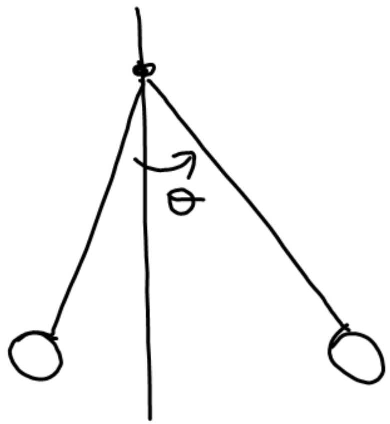
$$\frac{d^2\theta}{dt^2} + \operatorname{sen}(\theta) = 0 \qquad 0 \leq \theta \leq 3^\circ$$

EDO NL

2

$$\operatorname{sen}(\theta) = \theta$$

$$\frac{d^2\theta}{dt^2} + \theta = 0$$



1

$$\frac{dy}{dt} + 5y^2 = 0$$

EDO NL

2

$$\left(\frac{dy}{dt}\right)^2 + \frac{d^2y}{dt^2} \cdot y = 0$$

EDO NL

$$ED \begin{cases} EDO \begin{cases} EDOL \\ EDONL \end{cases} \\ EDenDP. \end{cases}$$

Orden de una ED: La derivada de mayor orden establece el orden ED.

$$\frac{d^3y}{dx^3} + x^2\frac{d^2y}{dx^2} + 5x^3\frac{dy}{dx} + 8x^5 \cdot y = 6\cos(3x)$$

$$\Longrightarrow a_0(x)\frac{d^3y}{dx^3} + a_1(x)\frac{d^2y}{dx^2} + a_2(x)\frac{dy}{dx} + a_3(x)\,y = Q(x)$$

$a_0(x) = 1 \quad a_1(x) = x^2 \quad a_2(x) = 5x^3 \quad a_3(x) = 8x^5$

$Q(x) = 6\cos(3x)$

EDOL(3) NH CV

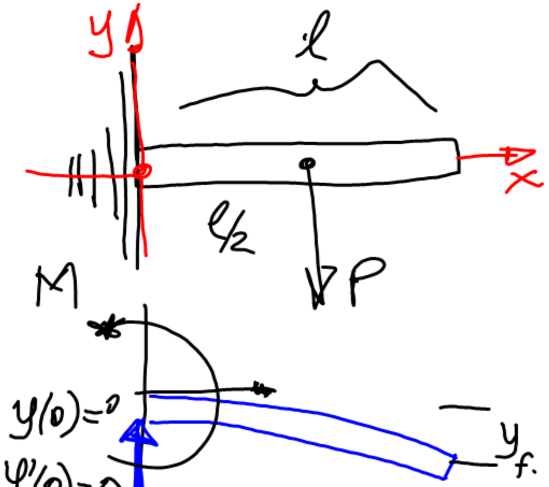
Orden ED.

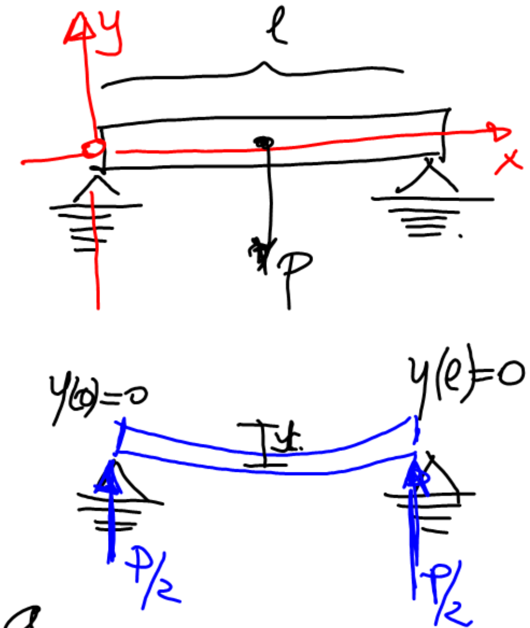
EDOL (3) . . . . . $\Rightarrow y_g = c_1 y_1 + c_2 y_2 + c_3 y_3$.

$$y_p \begin{cases} y(0) \\ y'(0) \\ y''(0) \end{cases}$$

$y_g\ (1)$ $\xrightarrow{\text{cond.}}$ $y_p\ (\infty)$

tantas condiciones
como orden EDO





$y(0)=0$
$y'(0)=0$
$y''(0)=P$
$y'''(0)=M$

CONDICIONES INICIALES

$M = P\cdot\frac{\ell}{2}$

$$\frac{d^4 y}{dx^4} = a,$$

$y(0)=0$
$y(\ell)=0$
$y''(0)=P/2$
$y''(\ell)=P/2$

CONDICIONES DE FRONTERA.

$$y(x) = C_1 y_1 + C_2 y_2 + C_3 y_3 + C_4 y_4.$$

SOLUCIÓN GENERAL

SOL. PARTICULARES

EDOL(2)Hcc: $\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = 0$

$$y_g = c_1 y_1 + c_2 y_2$$

si $c_1 = 1$ $c_2 = 0$

$$y_p = y_1$$

si $c_1 = 0$ $c_2 = 1$

$$y_p = y_2$$

$$y_p = 3y_1 + 4y_2$$

ED
- EDO
  - L
    - 1er orden
    - orden superior a 1 — II, III
  - NL
    - 1er orden — I
    - orden superior 1. — X
- EDenDP.
  - L
  - CL. — IV.
  - NL

$$\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = z^3$$

$z(x, y)$

EDO Lineales

$$a_0(x)\frac{d^2y}{dx^2}+a_1(x)\frac{dy}{dx}+a_2(x)y=Q(x)$$

EDOL (2)
- HOMOGENEA. $Q(x)=0$
- NO-HOMOGENEA $Q(x)\neq 0$

EDOL (2)
- COEFICIENTES VARIABLES
- COEFICIENTES CONSTANTES