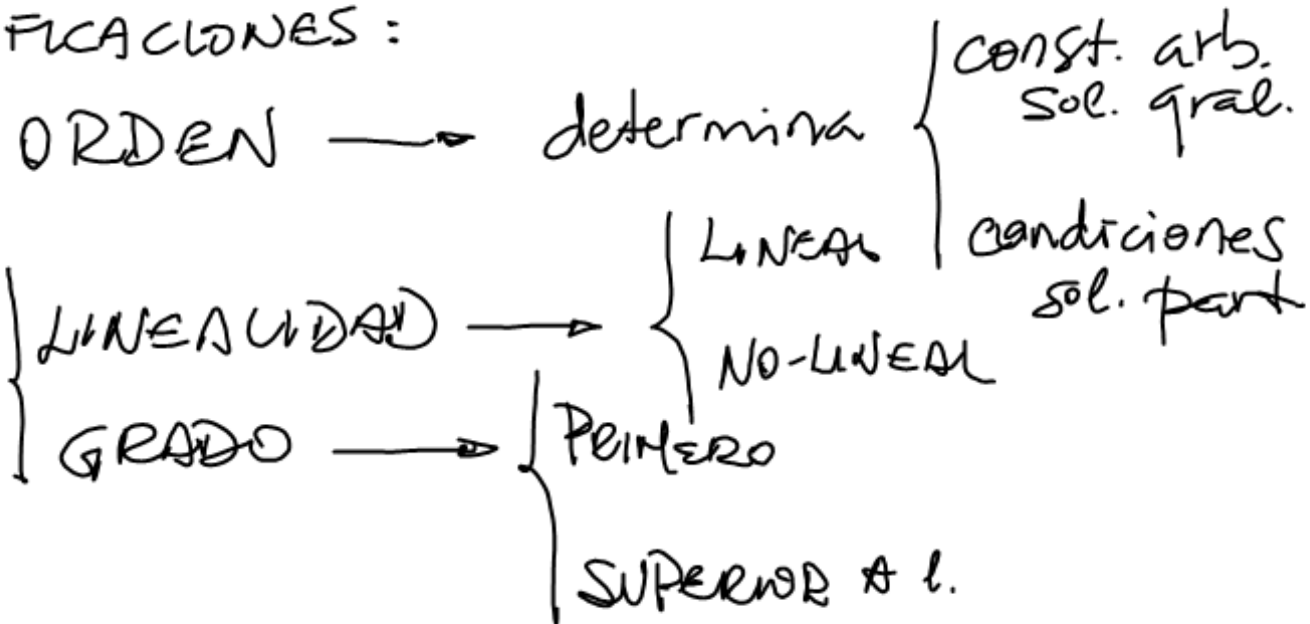


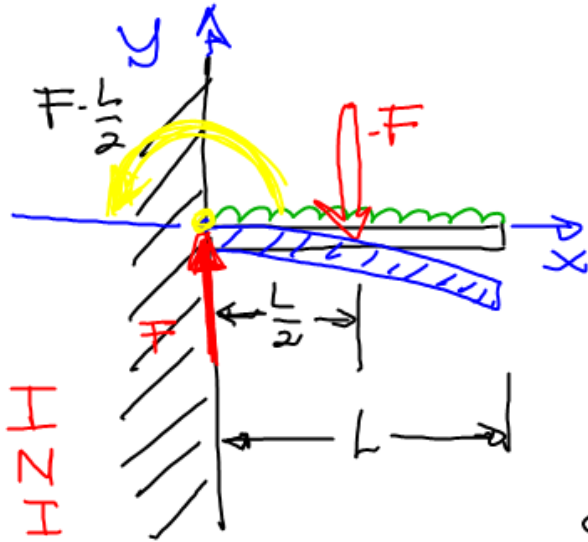
ECUACIONES DIFERENCIALES ORDINARIAS

CLASIFICACIONES:



CONDICIONES
ORDEN { CUÁNTAS

INICIALES
DE FRONTERA.



CONDICIONES

$$y(0) = 0$$

$$y'(0) = 0$$

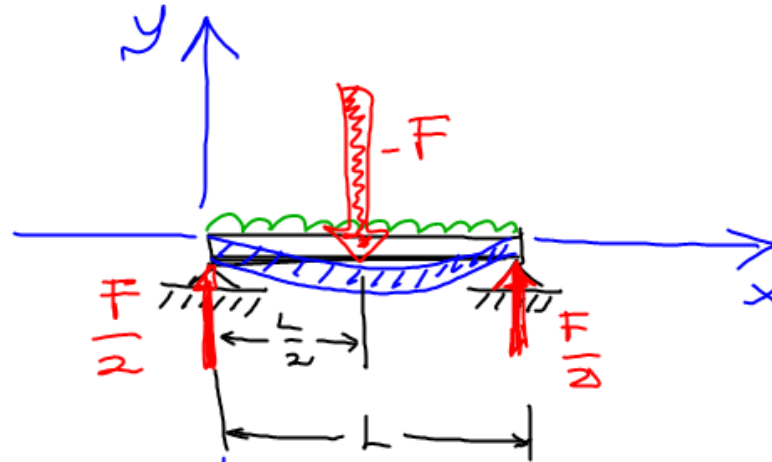
$$y''(0) = F$$

$$y'''(0) = F \cdot \frac{L}{2}$$

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

$$0 \leq x \leq L$$

$$0 \leq x \leq L$$



$$y(0) = 0$$

$$y(L) = 0$$

$$y''(0) = \frac{F}{2}$$

$$y'(L) = \frac{F}{2}$$

DE FRONTERA

LINEALIDAD UNA EDO(n)

$$F\left(x, y, \frac{dy}{dx}, \frac{d^2y}{dx^2}, \dots, \frac{d^ny}{dx^n}\right) = 0$$

SERÁ LINEAL SI:

a) $G\left(x, y, \frac{dy}{dx}, \frac{d^2y}{dx^2}, \dots, \frac{d^ny}{dx^n}\right) = Q(x)$

b) G es lineal respecto a y^n

$$G\left(x, \lambda y, \frac{d}{dx}(\lambda y), \frac{d^2}{dx^2}(\lambda y), \dots, \frac{d^n}{dx^n}(\lambda y)\right) = \lambda G(\dots)$$

$\lambda = \text{constante.}$

$$3x^2 \frac{d^2 y}{dx^2} - 6x \frac{dy}{dx} + \frac{8}{x} y - 6x^2 + 2x = 0$$

$\pm D0(2)$

$\pm D0(2) L$

$$\underbrace{3x^2 \frac{d^2 y}{dx^2} - 6x \frac{dy}{dx} + \frac{8}{x} y}_{Q(x, y, \frac{dy}{dx}, \frac{d^2 y}{dx^2})} = 6x^2 - 2x$$

$$Q(x, y, \frac{dy}{dx}, \frac{d^2 y}{dx^2}) = Q(x)$$

$$3x^2 \frac{d^2}{dx^2} (2y) - 6x \frac{d}{dx} (2y) + \frac{8}{x} (2y) \Rightarrow$$

$$2 \left(3x^2 \frac{d^2 y}{dx^2} - 6x \frac{dy}{dx} + \frac{8}{x} y \right)$$

$$Q(x, y, \frac{dy}{dx}, \frac{d^2 y}{dx^2})$$

$$\left(\frac{d^2 y}{dx^2}\right)^3 + 4x \left(\frac{dy}{dx}\right)^2 + \frac{8}{x} y^5 = 0.$$

EDO(2) N-L $\boxed{G=3}$

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

EDO(1) NL

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

$$\frac{dy}{dx} + \frac{x}{y} = 0$$

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

NL

EL GRADO DE UNA EDO(n)
(CUANDO LAS POTENCIAS DE LOS
TÉRMINOS EN " y " SEAN ENTERAS)
SERÁ EL GRADO DE LA DERIVADA
DE MAYOR ORDEN.

EDO

1^{er} orden

CAP I

LINEALES $\left\{ \begin{array}{l} \text{GRADO} = 1 \\ \text{SG}(1) \\ \text{SP}(\infty) \end{array} \right.$

NO-LINEALES $\left\{ \begin{array}{l} \text{GRADO} = 1 \\ \text{SG}(1) \\ \text{SP}(\infty) \\ \text{GRADO} > 1 \\ \text{SS}(\#) \end{array} \right.$

orden
superior
a unid.

LINEALES
CAP II, III, IV $\left\{ \begin{array}{l} \text{GRADO} = 1 \\ \text{SG}(1) \\ \text{SP}(\infty) \end{array} \right.$

NO-LINEALES $\left\{ \begin{array}{l} \text{GRADO} = 1 \\ \text{SG}(1) \\ \text{SP}(\infty) \\ \text{GRADO} > 1 \\ \text{SS}(\#) \end{array} \right.$

$$\frac{dy}{dx} = \frac{y}{x}$$

$$\frac{dy}{dx} = \frac{x}{y}$$

$$\frac{dy}{dx} - \frac{y}{x} = 0$$

EDO(1) L

$$\frac{dy}{dx} - \frac{x}{y} = 0$$

EDO(1) NL

$$\frac{dy}{y} = \frac{dx}{x}$$

$$y dy = x dx$$

$$\int \frac{dy}{y} = \int \frac{dx}{x}$$

$$\int y dy = \int x dx$$

$$\frac{y^2}{2} + k_1 = \frac{x^2}{2} + k_2$$

$$y^2 - x^2 = 2(k_2 - k_1)$$

$$\boxed{y^2 - x^2 = C}$$

$$\mathcal{L}y + k_1 = \mathcal{L}x + k_2$$

$$\mathcal{L}y - \mathcal{L}x = k_2 - k_1$$

$$\mathcal{L}\left(\frac{y}{x}\right) = k_2 - k_1$$

$$\frac{y}{x} = e^{k_2 - k_1}$$

$$F(x, y) = C.$$

$$\boxed{y = Cx} \rightarrow y = f(x)$$

FÓRMULA GENERAL DE LA EDO(n) L

$$a_0(x) \frac{d^2 y}{dx^2} + a_1(x) \frac{d^{n-1} y}{dx^{n-1}} + \dots + a_{n-1}(x) \frac{dy}{dx} + a_n(x) y = Q(x)$$

TODAS LAS LINEALES GRADO=1

TODAS LAS DE GRADO > 1 NO-LINEALES