

# SEFI


Apoyo moral y material a  
la FI y a la UNAM.

# Capítulo 1-

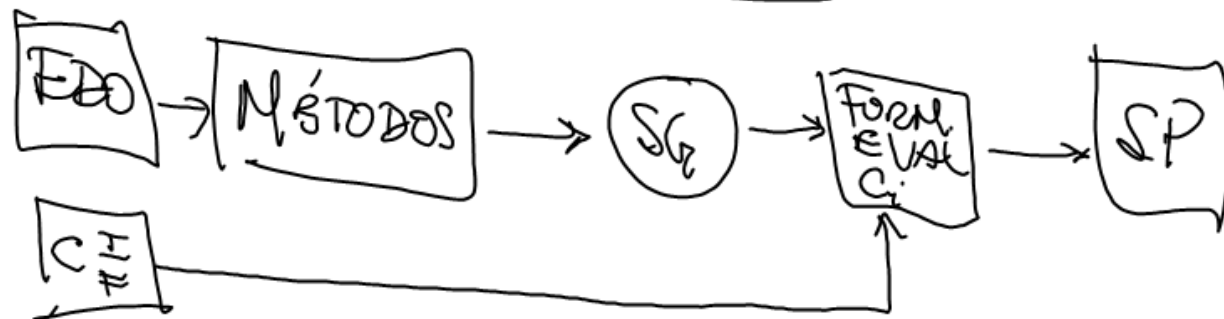
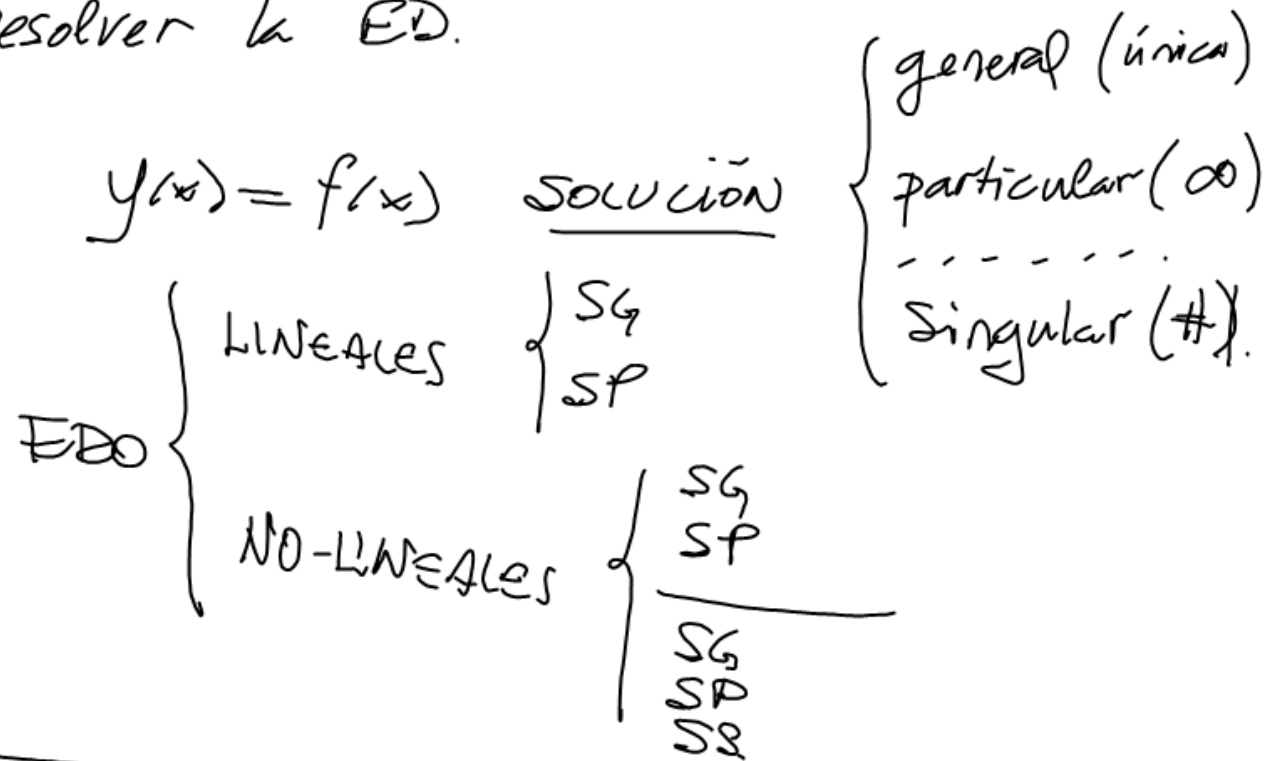
## Definiciones:-

Ecuación diferencial: es una expresión matemática que tiene forma de "Ecuación" pero que además tiene al menos una de las derivadas de una función desconocida denominada "incógnita".

$$F(x, y, y') = 0 \quad y = F(\quad)$$


 derivada respecto v.i.  
 incógnita  
 Variable independiente.

Buscar cuál es la forma de la incógnita se conoce como resolver la ED.



# Ecuación Diferencial No Lineal 1º Orden

$\pm$  DO(1) L. CV NH.

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

$$y = ce^{-\int p(x)dx} + e^{-\int p(x)dx} \int e^{\int p(x)dx} q(x) dx.$$

$$F(x, y, y') = 0 \Rightarrow y' = G(x, y)$$

$$M(x, y) + N(x, y) \frac{dy}{dx} = 0$$

MVS

$$P(x)Q(y) + R(x)S(y) \frac{dy}{dx} = 0$$

$$\int \frac{P(x)}{R(x)} dx + \int \frac{S(y)}{Q(y)} dy = C_1 \Rightarrow \text{Sol. GEN.}$$

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

$$f(x, y) = C_1$$

$$M(x, y) + N(x, y) \frac{dy}{dx} = 0$$

MEDE

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} \rightarrow \text{EXACTA.}$$

$$\int M(x, y) dx + \int \left[ N(x, y) - \frac{\partial}{\partial y} \int M dx \right] dy = C,$$

SOL. GERAL

$$M(x, y) + N(x, y) \frac{dy}{dx} = 0$$

$$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x} \quad \text{NO-EXACTA.}$$

MFI.

$$\mu(x, y) M(x, y) + \mu(x, y) N(x, y) \frac{dy}{dx} = 0$$

EXACTA

$$\frac{\partial}{\partial y} (\mu(x, y) M(x, y)) = \frac{\partial}{\partial x} (\mu(x, y) N(x, y))$$

$$M(x, y) \frac{\partial \mu(x, y)}{\partial y} + \mu(x, y) \frac{\partial M(x, y)}{\partial y} = N(x, y) \frac{\partial \mu}{\partial x} + \mu(x, y) \frac{\partial N}{\partial x}$$

$$\boxed{\mu(x, y)} \quad \mu \Rightarrow \mu(x)$$

$$\left( \frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{N} \right) dx + \frac{d\mu}{\mu} = 0$$

$$\mu \Rightarrow \mu(y)$$

$$\left( \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{M} \right) dy + \frac{d\mu}{\mu} = 0$$

$$M(x, y) + N(x, y) \frac{dy}{dx} = 0$$

$$\boxed{MCH}$$

$$M(\lambda x, \lambda y) \Rightarrow \lambda^m M(x, y) \quad N(\lambda x, \lambda y) = \lambda^n N(x, y)$$

$$m=n$$

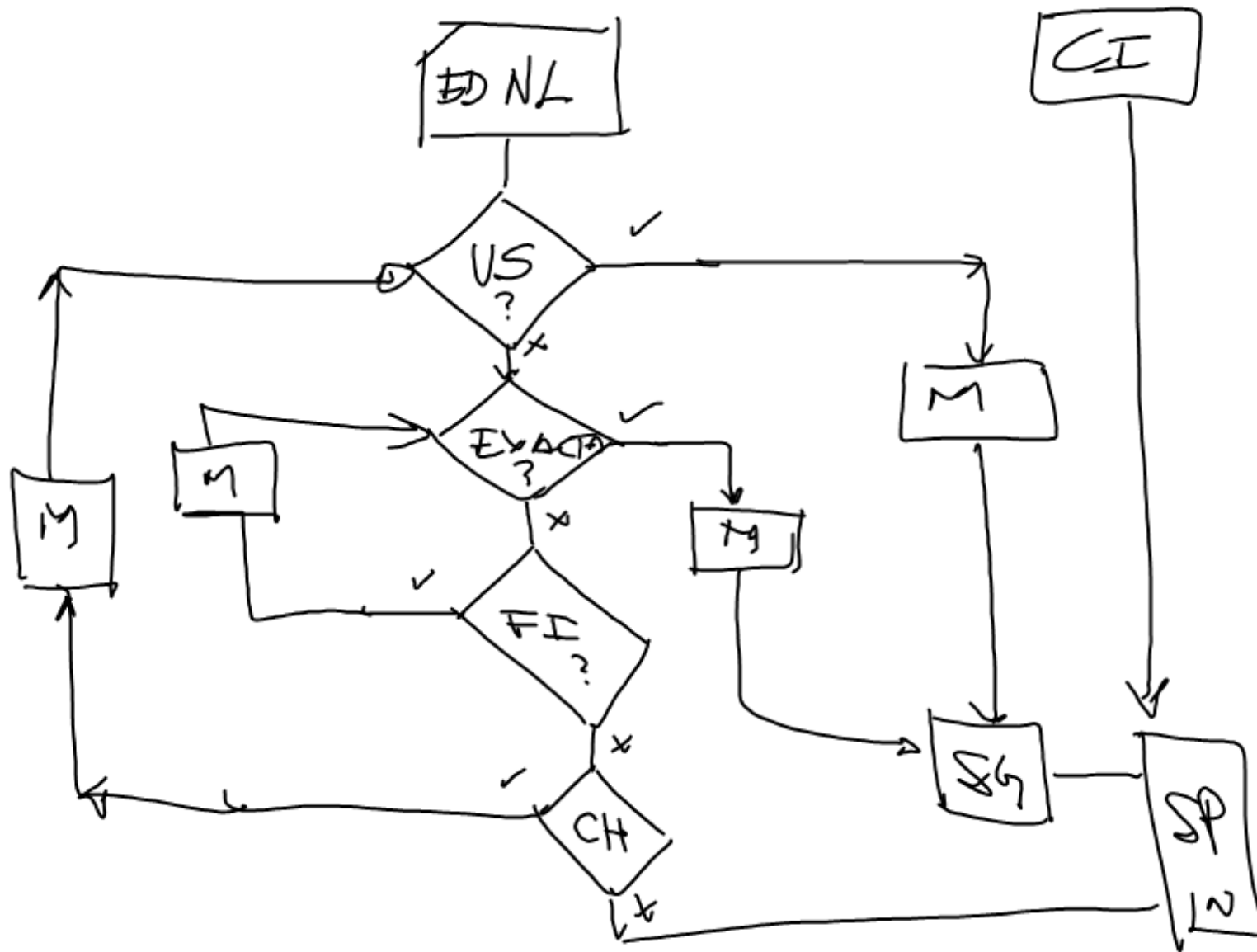
EDO(1)NL  $\rightarrow$  COEFICIENTES HOMOGÉNEOS.

$$y(x) = u(x) \cdot x \quad \text{ó} \quad x(y) = v(y) \cdot y$$

$$u(x) = \frac{y(x)}{x}$$

EDO(1)NL  $\rightarrow$  VAR SEP.

$$v(y) = \frac{x(y)}{y}$$





$$x - y \cdot \cos\left(\frac{y}{x}\right) + x \cdot \cos\left(\frac{y}{x}\right) \frac{dy}{dx} = 0$$