

EDO(1)NL

Teorema de existencia y unicidad
de las soluciones

$$\frac{dy}{dx} = f(x, y) \quad (x_0, y_0)$$

a) $f(x, y)$ es continua

b) $\frac{\partial f}{\partial y}$ es continua.

$$\frac{dy}{dx} = \frac{y}{x} \quad f(x, y) \Rightarrow \frac{y}{x} \quad x_0 = 0$$

$$\frac{\partial f}{\partial y} = \frac{1}{x}$$

$$\frac{dy}{dx} = \frac{y}{x} \quad \text{Variables Separables}$$

$$\frac{\frac{dy}{dx}}{y} = \frac{1}{x}$$

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

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

$$\ln(y) + C_1 = \ln(x) + C_2$$

$$\ln(y) = \ln(x) + (C_2 - C_1)$$

$$e^{\ln(y)} = e^{\ln(x) + (C_2 - C_1)}$$

$$y = e^{\ln(x) + C_0}$$

$$y = e^{C_0} x \Rightarrow y = Cx$$

$\exists DO(1)NL$

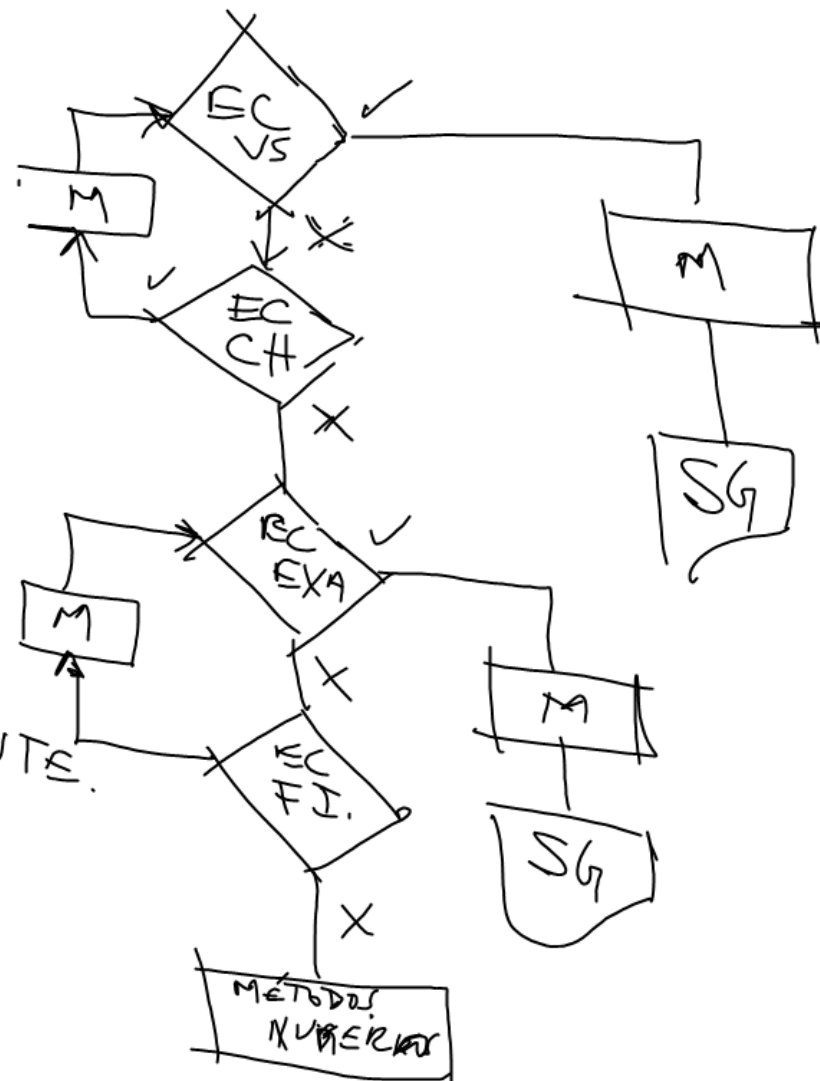
$$E_C \Rightarrow M(x, y) + N(x, y) \frac{dy}{dx} = 0$$

Variables
separables

coeficientes
homogeneos

EXACTA.

FACTOR
INTEGRANTE.



$$\Rightarrow M(x, y) dx + N(x, y) dy = 0$$

VARIABLES
SEPARABLES

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

$\Downarrow$

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

$$\text{SG} \Rightarrow \int \frac{P(x)}{R(x)} dx + \int \frac{S(y)}{Q(y)} dy = C$$

$$(y^2 + xy^2) \frac{dy}{dx} + (x^2 - yx^2) = 0$$

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

$$(1+x)y^2 \cdot \frac{dy}{dx} + x^2(1-y) = 0$$

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

SG.

$$\int \frac{x^2}{(1+x)} dx + \int \frac{y^2}{(1-y)} dy = C$$

$$\begin{array}{r} x-1 \overline{) x^2} \\ \underline{-x^2 - x} \\ 0 - x \\ \underline{+x + 1} \\ 0 1 \end{array}$$

$$\begin{array}{r} -y-1 \overline{) y^2} \\ \underline{-y^2 + y} \\ 0 + y \\ \underline{-y + 1} \\ 0 1 \end{array}$$

$$\int (x-1 + \frac{1}{x+1}) dx + \int (-y-1 + \frac{1}{1-y}) dy = C,$$

$$\int x dx - \int dx + \int \frac{dx}{x+1} + \int -y dy - \int dy + \int \frac{1}{1-y} dy = C$$

$$\frac{x^2}{2} - x + \ln(x+1) - \frac{y^2}{2} - y - \ln(1-y) = C_1$$

SG

$$\underset{S}{e^y} \left(\underset{R}{1+x^2} \right) \cdot \underset{P}{\frac{dy}{dx}} - \underset{Q}{2x(1+e^y)} = 0$$

$$\int \frac{-2x}{(1+x^2)} dx + \int \frac{e^y}{1+e^y} dy = C,$$

$$-\int \frac{du}{u} + \int \frac{dv}{v} = C \quad \begin{array}{l} u=1+x^2 \\ v=1+e^y \end{array}$$

$$-L u + L v = C,$$

$$-L(1+x^2) + L(1+e^y) = C$$

$$L\left(\frac{1+e^y}{1+x^2}\right) = C$$

$$\frac{1+e^y}{1+x^2} = e^C \Rightarrow C_1$$

$$1+e^y = C(1+x^2)$$