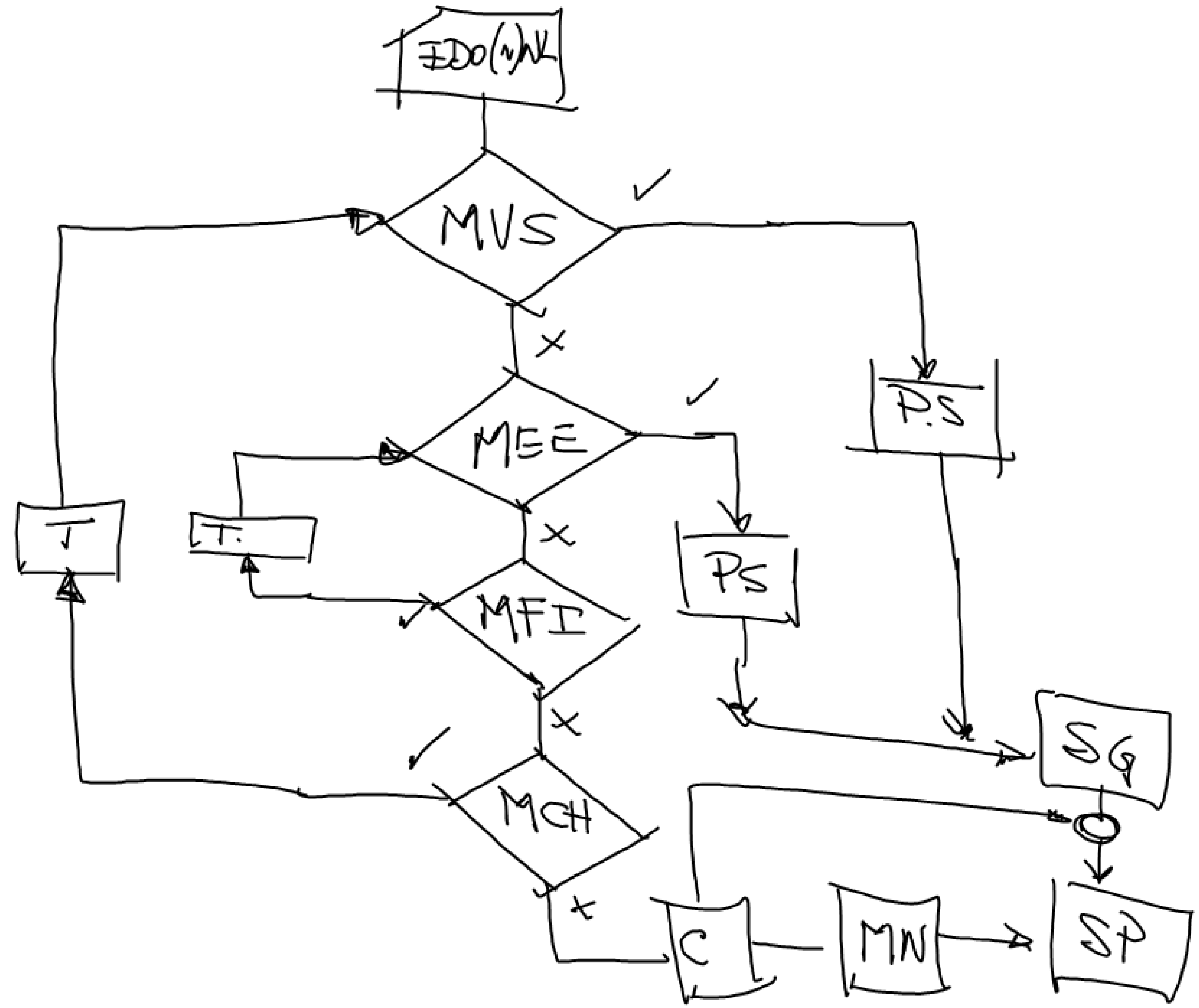
I

Ecuación no lineal de primer orden

4 métodos de solución.



$$F\left(x, y, \frac{dy}{dx}\right) = 0 \quad \text{EDO}(1)$$

$$\frac{dy}{dx} = G(x, y) \quad \text{EDO}(1)\,NL$$

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

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

$$\Rightarrow \quad M(x,y) + N(x,y)\frac{dy}{dx} = 0 \quad \underline{\text{EDO}(1)\,NL}$$

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

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

Método de Variables separables.

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

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

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

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

$\boxed{SG}$ $$\int\frac{P(x)}{R(x)}dx + \int\frac{S(y)}{Q(y)}dy = C_1$$

$$\boxed{f(x,y) = C_1}$$

83. $(y^2+xy^2)\,y'+x^2-yx^2=0.$

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

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

P Q S R

$\boxed{SG} \to$

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

$$\begin{array}{r|l} x^2 & x+1 \\ \hline -x^2 & x-1 \\ -x & \\ \hline -x & \\ +x & \\ +1 & \\ \hline 1 & \end{array}$$

$$\int\left(x-1+\frac{1}{x+1}\right)dx+\int\left(-y-1-\frac{-1}{1-y}\right)dy=C_1$$

$$\begin{array}{r|l} -y+1 & y^2 \\ & -y^2+y \\ \hline & y \\ & -y+1 \\ \hline & 1 \end{array} \quad \text{quotient: } -y-1$$

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

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

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

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