Clasificación de las E.D.

ED

- E.D. Ordinarias
  - $y(x)$
  - única
  - $\frac{dy}{dx}$
- ED en Derivadas Parciales
  - $F(x, y, t)$
  - dos o más v. i.
  - $\frac{\partial F}{\partial x}$

ORDEN ↓ Der. de > orden ↓ or. E.D.

- LINEALES
  - 1 - SG
  - ∞ - SP.
  - 1^{er} orden CAP. 1.
  - $n \geq 2$ orden superior CAP 2
  - CAP 3
- NO LINEALES
  - 1 SG
  - ∞ SP.
  - 1 SG
  - ∞ SP
  - # SS
  - 1^{er} orden CAP 1.
  - $n \geq 2$ orden superior X

CAP. 4

EDO
L

- 1er orden
- Orden superior

- Coef. const.
- Coef. var.

- Homog.
- No-hom.

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

$\boxed{\text{EDOL}}$ (n) será de coeficientes constantes

Si $\forall_i \; a_i(x)=a_i$

Será Homogenea si $Q(x)=0$

No-Homog. si $Q(x)\neq 0$

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

EDOL(2) CV NH.

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

EDOL(1) CC H.

$\frac{dy}{dx} = y \qquad y = e^{x} \qquad \frac{dy}{dx} = e^{x}$

$y_g = c_1 e^{x}$

$\frac{dy}{dx} = 4y \qquad y_g = c_1 e^{4x}$

$c_1 4e^{4x} = 4(c_1 e^{4x}) \qquad \frac{dy}{dx} = c_1 4e^{4x}$

$0 = 0$

$$y = c_1 e^{mx} \qquad \frac{dy}{dx} = c_1 m e^{mx}$$

$$c_1 = \frac{y}{e^{mx}} \qquad c_1 = \frac{\frac{dy}{dx}}{m e^{mx}}$$

$$\frac{y}{e^{mx}} = \frac{\frac{dy}{dx}}{m e^{mx}}$$

$$y m e^{mx} = \frac{dy}{dx} e^{mx}$$

$$my = \frac{dy}{dx}$$

EDOL (1) cc H.

$$\boxed{\frac{dy}{dx} - my = 0} \qquad y = c_1 e^{mx}$$

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

EDOL(1) CV NH.

$$\frac{dy}{dx} - m\, y = 0$$

EDOL(1) CC H.

TAREA 2020-03

CLASIFICAR LAS SIG. ED. / Sábado 23:59

1- $\frac{dy}{dx} + xy = 0$

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

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

4- $xy^2\frac{dy}{dx} + y^3 = \frac{1}{x}$

5- $\frac{dy}{dx} = \frac{y-x}{y+x}$

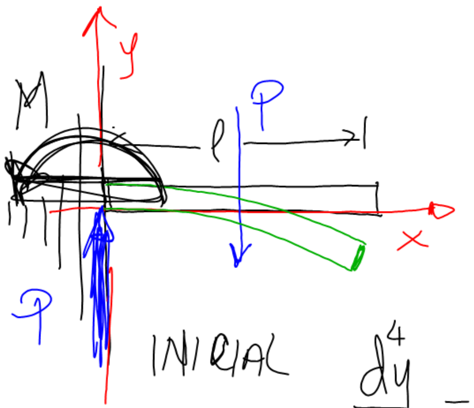
6- $3e^x \tan(y) + (2-e^x)\sec^2(y)\frac{dy}{dx} = 0$

7- $\frac{d^2y}{dx^2} + 4y = \operatorname{Sen}(2x)$

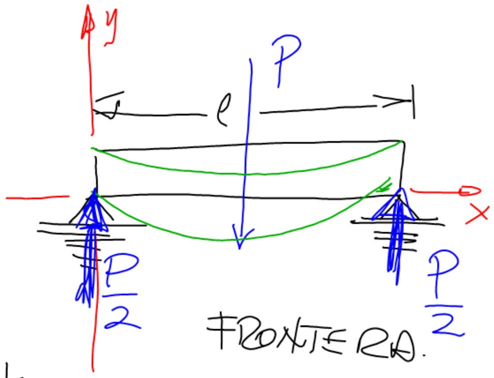
8- $\frac{\partial^2 T}{\partial x^2} - k_1 \frac{\partial^2 T}{\partial t^2} = 0$

9- $\frac{\partial^2 \theta}{\partial x^2} + a_1\frac{\partial^2 \theta}{\partial y^2} + a_2\frac{\partial^2 \theta}{\partial z^2} = 0$

10- $\frac{\partial^3 u}{\partial x^3} + \left(\frac{\partial u}{\partial x}\right)\left(\frac{\partial^2 u}{\partial y^2}\right) = u.$



INICIAL



FRONTERA.

$$\frac{d^4y}{dx^4} = k_1$$

INICIAL

$$\begin{cases} x=0 & y(0)=0 \\ & x=\ell \quad y_{max} \\ x=0 & y'(0)=0 \\ x=0 & y''(0)=P \\ x=0 & y'''(0)=M \Rightarrow \boxed{-P\cdot\frac{\ell}{2}} \end{cases}$$

FRONTERA

$$\begin{cases} x=0 & y(0)=0 \\ x=\ell & y(\ell)=0 \\ & x=\frac{\ell}{2} \quad y_{max} \\ x=0 & y''(0)=\frac{P}{2} \\ x=\ell & y''(\ell)=\frac{P}{2} \end{cases}$$

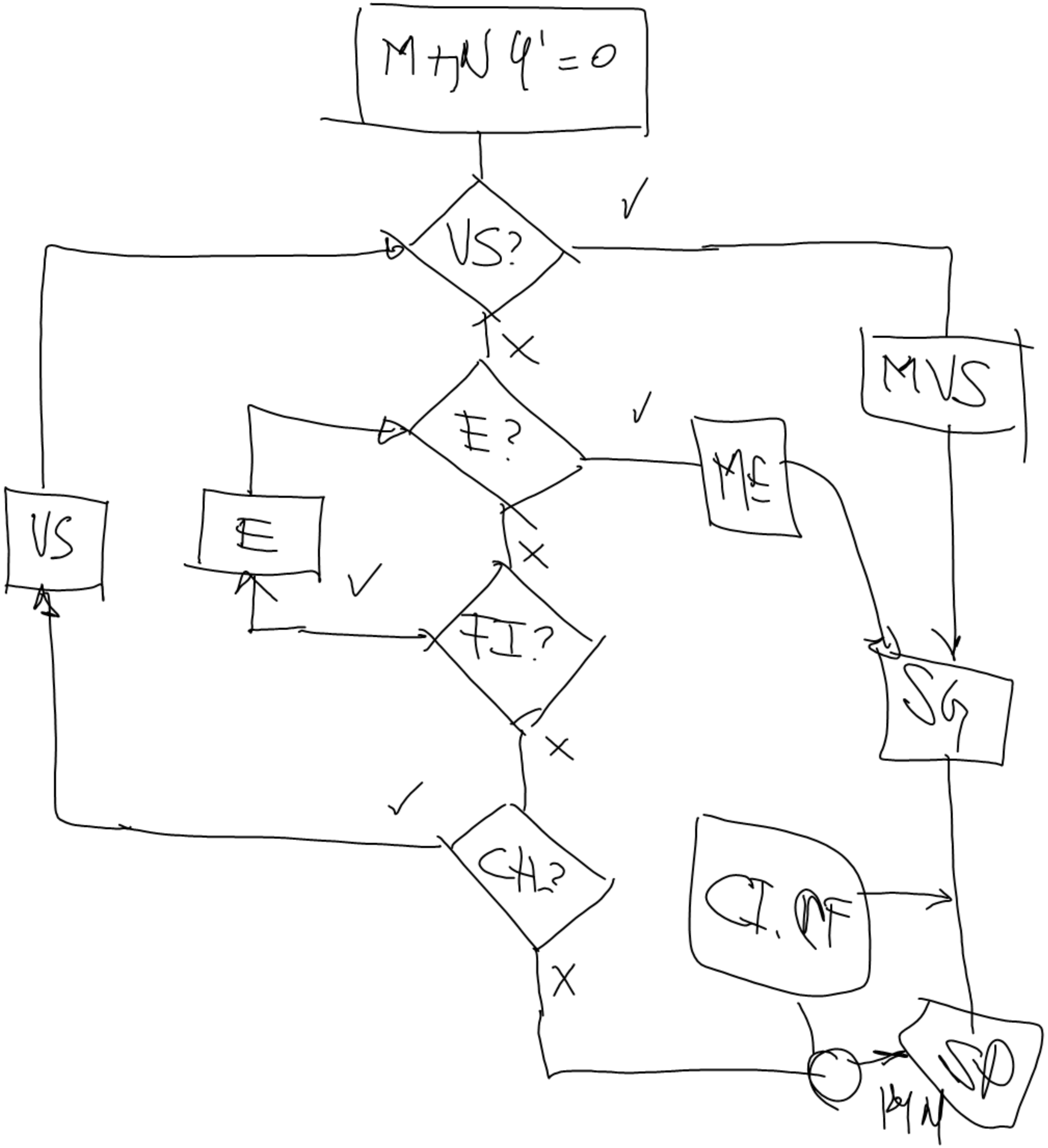
CAP. 1

RESOLVER EDOL y NL (1er orden)

EDO (1) NL $\quad \dfrac{dy}{dx} \quad$ EDO L (1) c v - NH.

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

EDO NL (1) Procedimiento



MÉTODO VARIABLES SEPARABLES.

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

$$\frac{1}{R(x)Q(y)}\left(P(x)Q(y) + R(x)S(y)\frac{dy}{dx} = 0\right)$$

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

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

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

$$\int\frac{S(y)}{Q(y)}dy + C_1 = -\int\frac{P(x)}{R(x)}dx + C_2$$

$$\left[\int\frac{S(y)}{Q(y)}dy\right] + \left[\int\frac{P(x)}{R(x)}dx\right] = C_2 - C_1$$

$$F(x,y) = C. \quad SG$$

$$(1+e^x)y\frac{dy}{dx}=e^x$$

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

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

$$\left.\begin{aligned}P(x)&=-e^x\\ Q(y)&=1\\ R(x)&=1+e^x\\ S(y)&=y\end{aligned}\right\}\ \frac{1}{1+e^x}\left(-e^x+(1+e^x)y\frac{dy}{dx}=0\right)$$

$$-\frac{e^x}{1+e^x}+y\frac{dy}{dx}=0$$

$$-\frac{e^x}{1+e^x}dx+y\,dy=0$$

$$\frac{du}{u}\qquad -\int\frac{e^x}{1+e^x}dx+\int y\,dy=C$$

$$u=1+e^x$$

$$du=e^x dx$$

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

SG

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

EDOL(1) CV H.

$$\underbrace{P(x)\,y}_{M} + \underbrace{(1)}_{N}\frac{dy}{dx} = 0$$

$P(x) = p(x)$

$Q(y) = y$

$R(x) = 1$

$S(y) = 1$

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

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

$$\int p(x)\,dx + Ly = C$$

$$Ly = C - \int p(x)\,dx$$

$$y = e^{\left(C - \int p(x)\,dx\right)}$$

$$y = e^{C} e^{-\int p(x)\,dx}$$

$$y = C e^{-\int p(x)\,dx}$$

$$\boxed{\frac{dy}{dx} + p(x)\,y = 0}$$

SG