$$F\left(x, y(x), \frac{dy}{dx}, \ldots\right) = 0$$

TEMAS

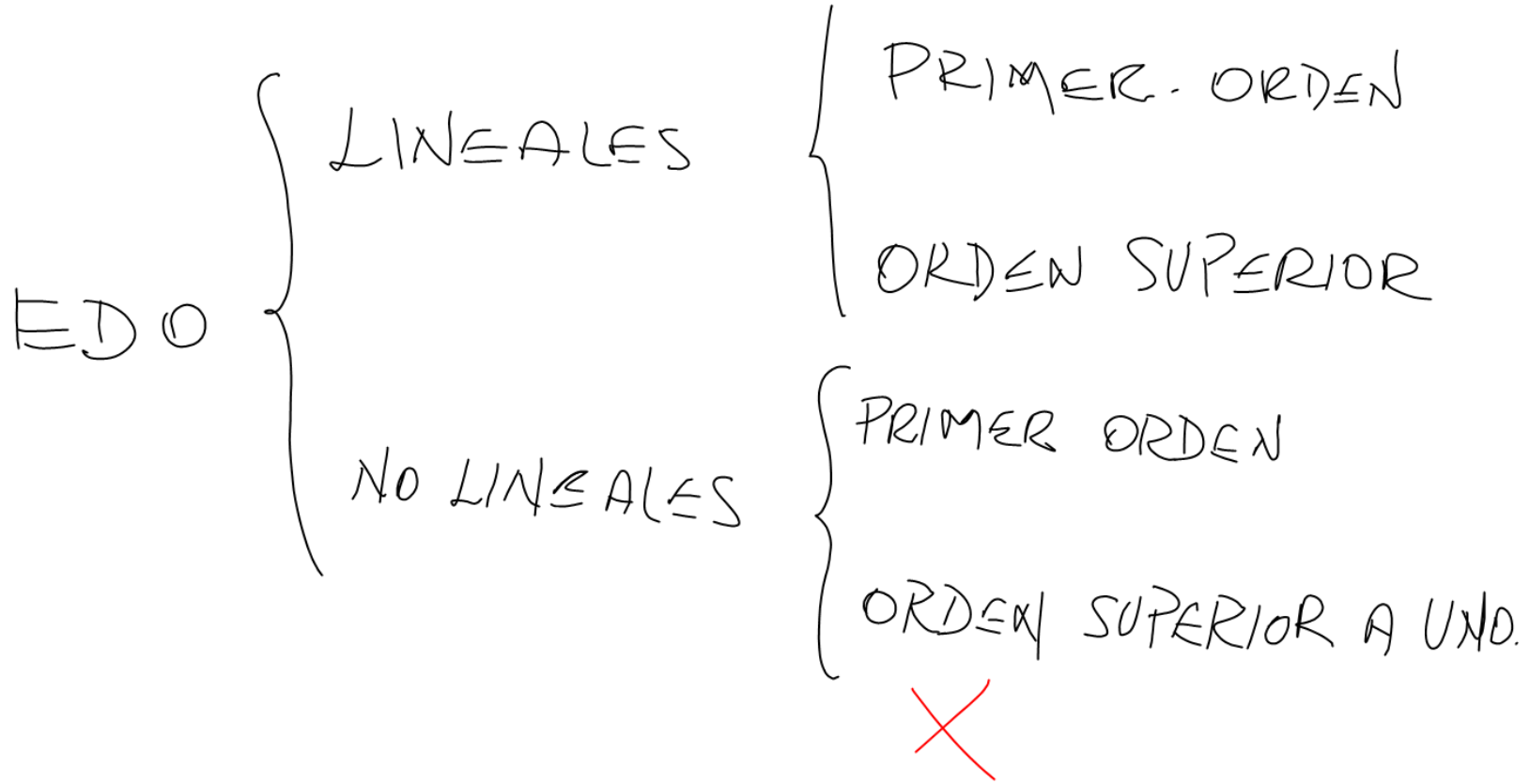
ECUACIÓN DIFERENCIAL ORDINARIA I, II, III

$$F\left(t, x(t), \frac{dx}{dt}, \frac{d^2x}{dt^2}, \ldots\right) = 0$$

$$F\left(x, y, z(x,y), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \ldots\right) = 0$$

TEMA IV

ECUACIÓN DIFERENCIAL EN DERIVADA PARCIAL.


EDO
LINEALES
PRIMER. ORDEN
ORDEN SUPERIOR
NO LINEALES
PRIMER ORDEN
ORDEN SUPERIOR A UNO.

EL "ORDEN" DE UNA E.D.O

ES EL "ORDEN" DE LA DERIVADA

DE MAYOR "ORDEN"

$\frac{dy}{dx} = y$ $\quad y = C_1 e^x$ SOLUCIÓN GENERAL $\quad$ ORDEN 1

$\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = 0$ $\quad$ ORDEN 2

$y_g = C_1 y_1 + C_2 y_2$

ORDEN = 4

$\frac{d^4y}{dx^4} + b_1 \frac{d^2y}{dx^2} + b_2 y = 3\cos(2x)$

$y_g = C_1 y_1 + C_2 y_2 + C_3 y_3 + C_4 y_4$

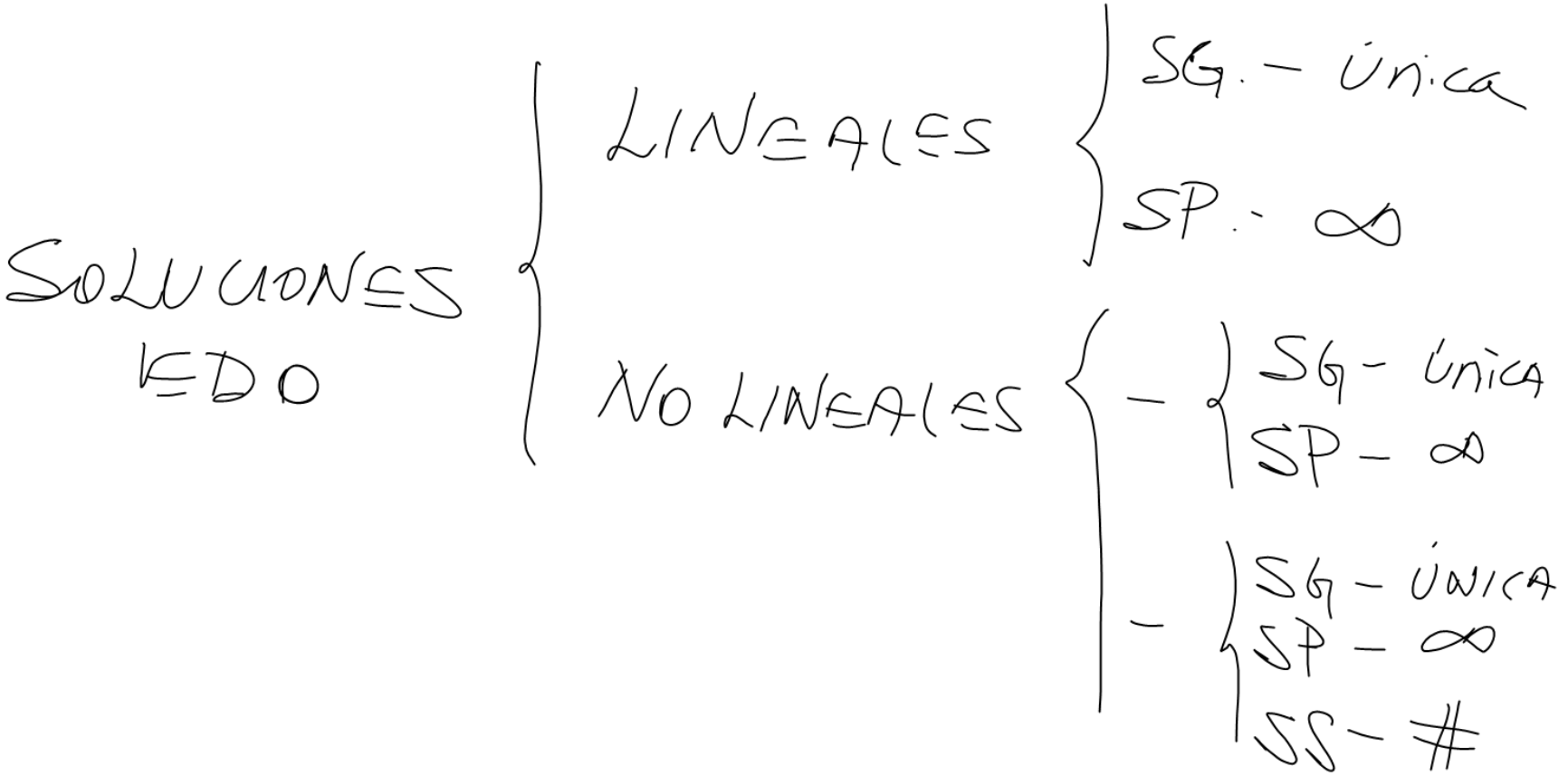
$$y_g = C_1 \cos(3x) + C_2 \operatorname{sen}(3x)$$

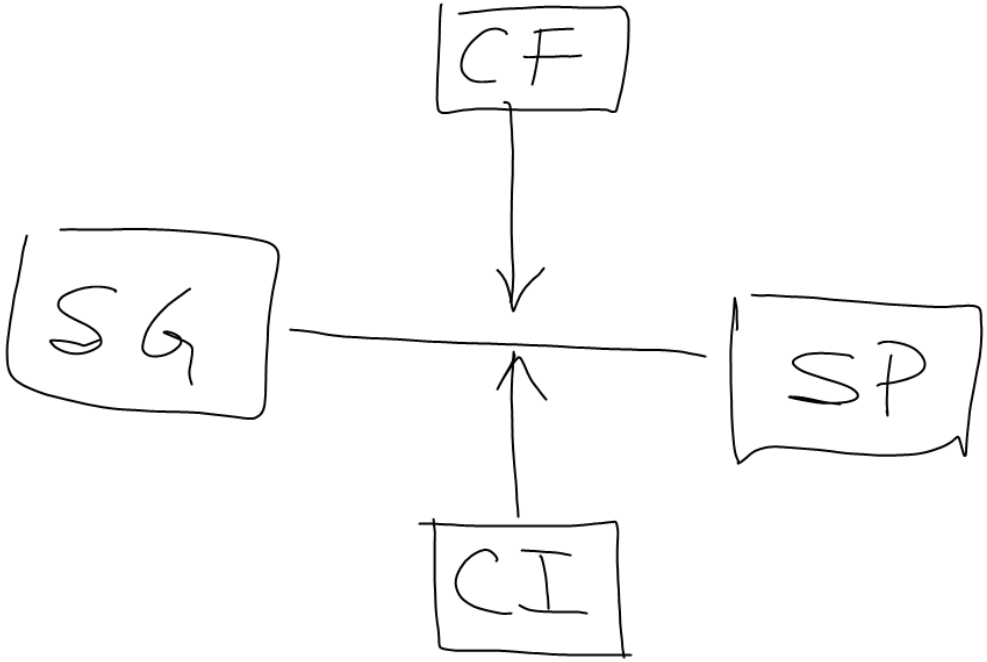
$$\frac{dy}{dx} = -3C_1 \operatorname{sen}(3x) + 3C_2 \cos(3x)$$

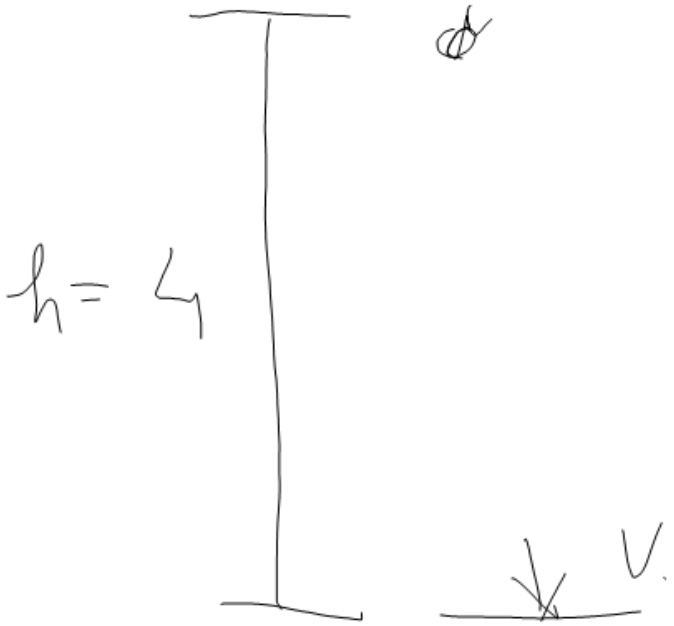
$$\frac{d^2y}{dx^2} = -9C_1 \cos(3x) - 9C_2 \operatorname{sen}(3x)$$

$$= -9\left(C_1 \cos(3x) + C_2 \operatorname{sen}(3x)\right)$$

$$\frac{d^2y}{dx^2} = -9y \longrightarrow \frac{d^2y}{dx^2} + 9y = 0$$


SOLUCIONES EDO
LINEALES
SG. - Única
SP. - ∞
NO LINEALES
- SG - Única
SP - ∞
- SG - ÚNICA
SP - ∞
SS - #


CF
SG
SP
CI



$$\frac{d^2y}{dt^2} = -g \qquad y(t)$$

$$\frac{d}{dt}\left(\frac{dy}{dt}\right) = -g$$

$$d\left(\frac{dy}{dt}\right) = -g\,dt$$

$$\int d\left(\frac{dy}{dt}\right) = -g\int dt$$

$$\frac{dy}{dt} + C_1 = -g(t) + C_2$$

$$\frac{dy}{dt} = -gt + (C_2 - C_1)$$

$$\frac{dy}{dt} = -gt + C_{10}$$

$$\int dy = \int (-gt + C_{10})\,dt$$

$$y + C_3 = -g\left(\frac{t^2}{2}\right) + C_{10}t + C_4$$

$$y_g = -\frac{g}{2}t^2 + C_{10}t + (C_4 - C_3)$$

$$\frac{d^2y}{dt^2} = -g$$

$$y_g = -\frac{g}{2}t^2 + C_{10}t + C_{20} \qquad y(0) = 4 \qquad y'(0) = 0$$

$$y(0) = -\frac{g}{2}(0)^2 + C_{10}(0) + C_{20} = 4$$

$y = 0 \quad t = \max$

$$-\frac{g}{2}t^2 + 4 = 0$$

$$t^2 = \frac{4 \times 2}{g}$$

$$t^2 = 0.815$$

$$t_1 = +0.902$$

$$\times \quad t_2 = -0.902$$

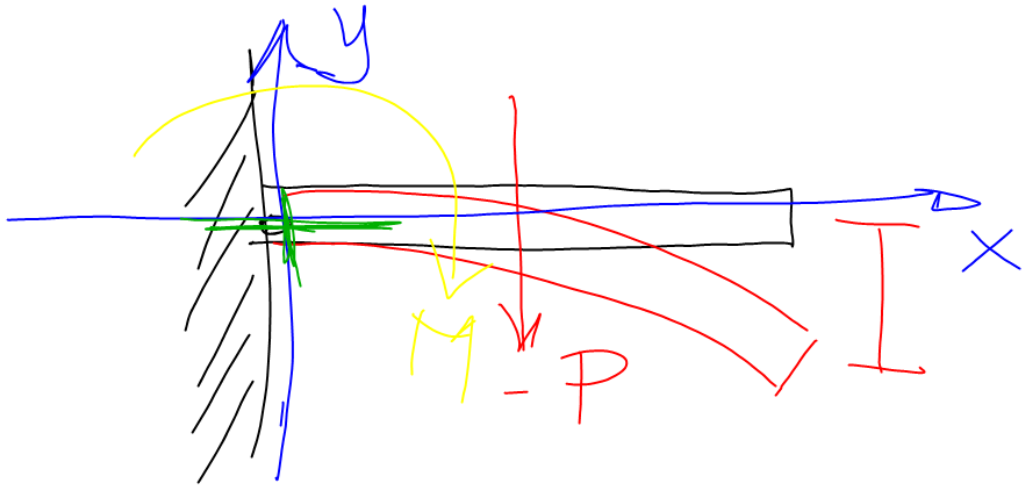
$$y(t) = -\frac{g}{2}(t^2) + C_1 t + 4 \qquad C_2 = 4$$

$$y'(t) = -gt + C_1$$

$$y'(0) = -g(0) + C_1 = 0 \qquad C_1 = 0$$

$$\boxed{y_p = -\frac{g}{2}t^2 + 4} \Leftarrow$$

$$\frac{dy_p}{dt} = -gt \rightarrow \left.\frac{dy_p}{dt}\right|_{t=0.902} = -8.68 \frac{m}{s}$$



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

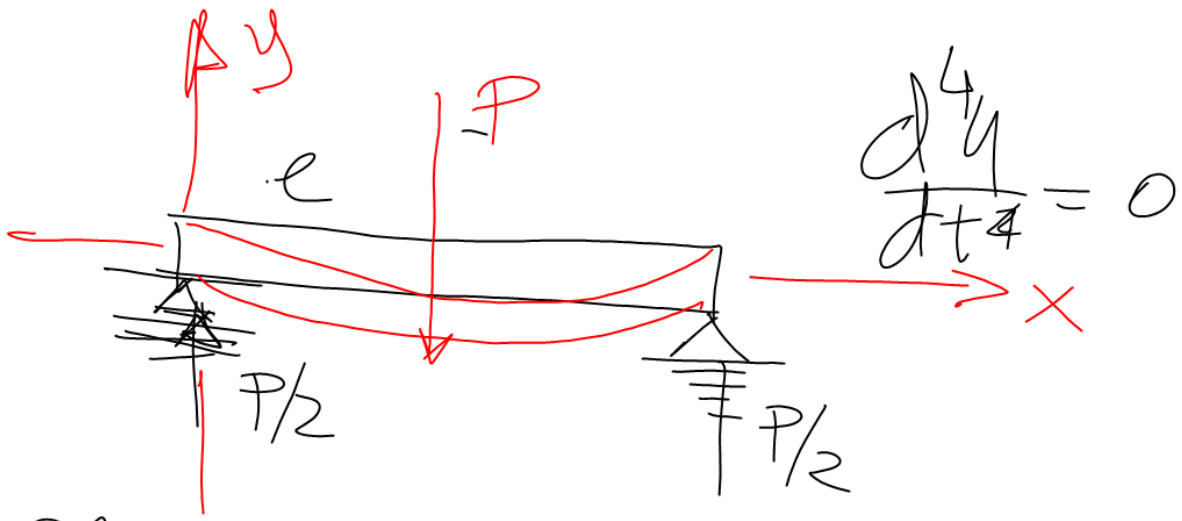
COND INICIALES

$$y(0) = 0$$

$$y'(0) = 0$$

$$y''(0) = P$$

$$y'''(0) = -M$$

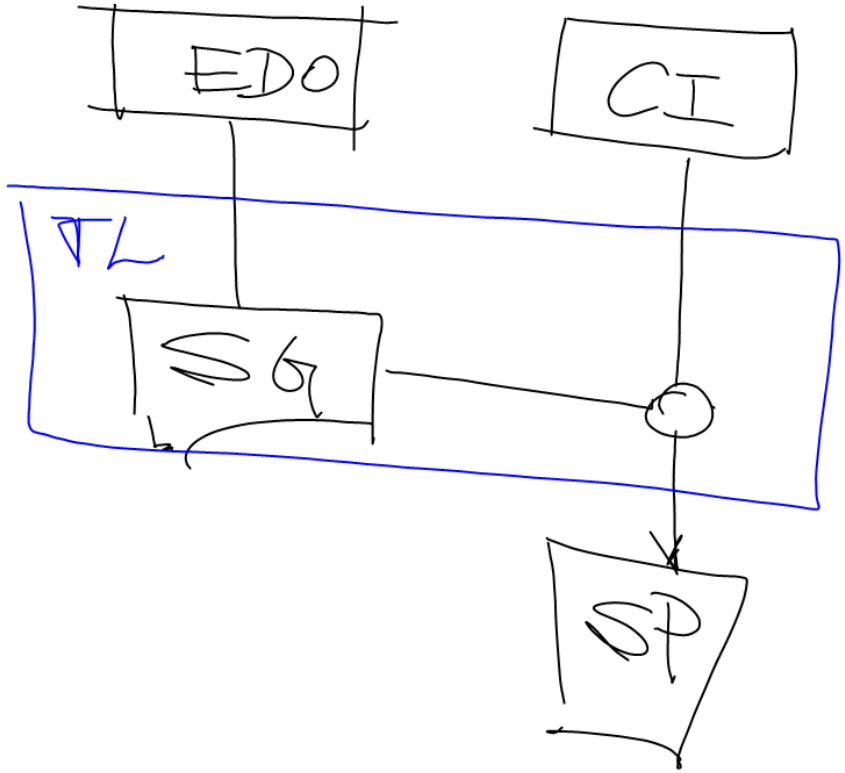


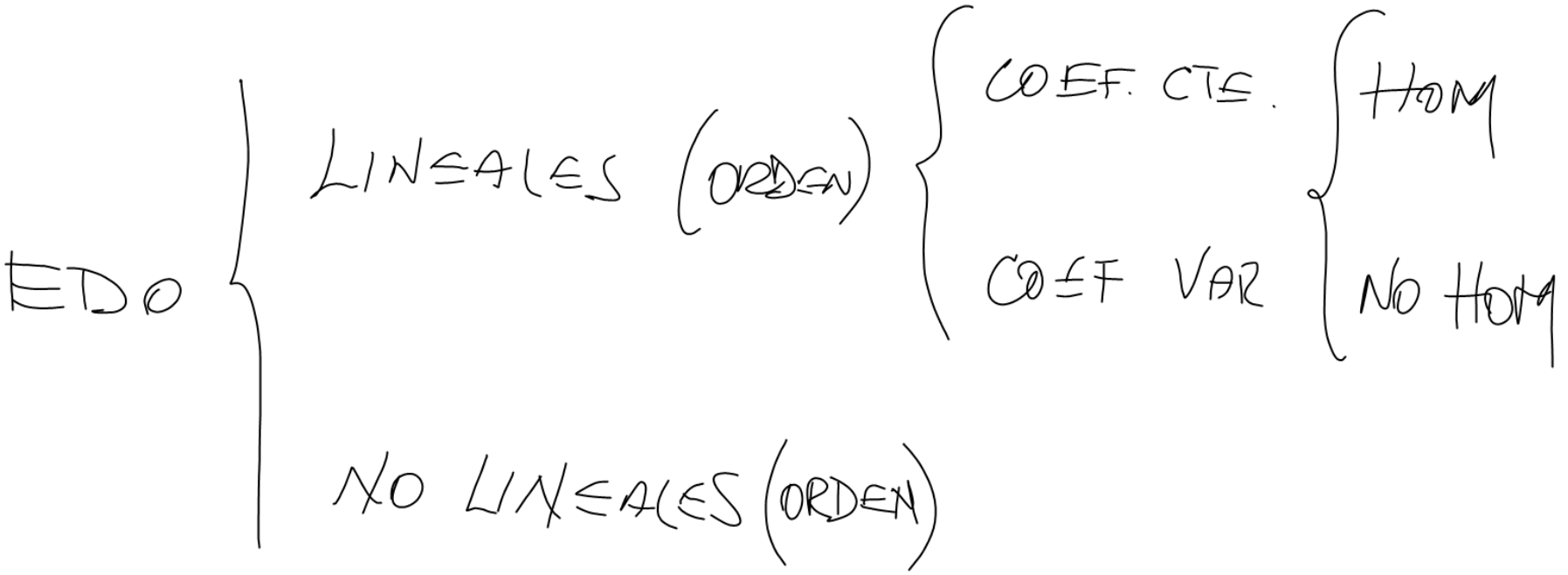
$$\frac{d^4y}{dx^4} = 0$$

COND. FRONTERA

$y(0) = 0$ $\quad y(\ell) = 0$

$y''(0) = \frac{P}{2}$ $\quad y''(\ell) = \frac{P}{2}$


EDO
CI
TL
SG
SP


EDO
LINEALES (ORDEN)
COEF. CTES.
HOM
COEF VAR
NO HOM
NO LINEALES (ORDEN)