ED

I II III

ORDINARIAS

$y(x)$

v.i.

- 1^{er} orden — I
- orden superior — II

IV

en Derivadas Parciales

$z(x,y)$ — dos v.i.

$F(x,y,z)$ — o más v.i.

- 1^{er} orden
- orden superior

EDO

- 1^er^ orden
  - Lineales
  - No lineales

  I
- orden superior
  - Lineales — II
  - No lineales — X

$$EDO(1)\begin{cases} L - \begin{cases} CC \\ CV. \end{cases} \begin{cases} H \\ NH. \end{cases} \\ \\ NL - \end{cases}$$

$$EDO(n)\begin{cases} L - \begin{cases} CC \\ CV \end{cases} \begin{cases} H \\ NH. \end{cases} \end{cases}$$

EDO (n) L CV NH

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

$$y_g(x) = C_1 y_1 + C_2 y_2 + \cdots\cdots + C_n y_n + F(x)$$

Solución particular debida a $Q(x)$

y_i ~~Soluciones particulares fundamentales~~

Condiciones (n) $\left\{\begin{array}{l}\text{iniciales}\\ \text{frontera}\end{array}\right\}$

$$y_p(x) = Ay_1 + By_2 + \cdots\cdots + Zy_n + F(x)$$

Solución particular

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 5e^{2x} \quad \begin{cases} y(0) = 4 \\ y'(0) = -3 \end{cases}$$

EDO (2) L cc NH.

$$y_g(x) = c_1 y_1 + c_2 y_2 + F(x)$$

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

$$y_H = e^{mx} \quad \frac{dy}{dx} = me^{mx} \quad \frac{d^2y}{dx^2} = m^2 e^{mx}$$

$$\left(m^2 e^{mx}\right) - 2\left(me^{mx}\right) + 2\left(e^{mx}\right) = 0$$

$$\left(m^2 - 2m + 2\right)e^{mx} = 0 \quad e^{mx} \neq 0$$

$$m \neq -\infty$$

$m^2 - 2m + 2 = 0$ ecuación (A) característica

$$m = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow \frac{2 \pm \sqrt{4 - 4(1)2}}{2}$$

$$m = \frac{2 \pm \sqrt{-4}}{2} \Rightarrow 1 \pm i$$

$$y_H = c_1 e^{(1+i)x} + c_2 e^{(1-i)x}$$

$$y_H = c_1 e^{x}\cos(x) + c_2 e^{x}\operatorname{sen}(x)$$

$$y_{NH} = c_1 e^{x}\cos(x) + c_2 e^{x}\operatorname{sen}(x) + \frac{5}{2}e^{2x}$$

$y(0) = 4$

$$4 = c_1 e^{(0)} \cos(0) + c_2 e^{(0)} \operatorname{sen}(0) + \frac{5}{2} e^{(0)}$$

$$4 = c_1(1)(1) + c_2(1)(0) + \frac{5}{2}(1)$$

$$\boxed{4 = c_1 + \frac{5}{2}}$$

$$\frac{dy}{dx} = c_1\left(-e^x \operatorname{sen}(x) + e^x \cos(x)\right) + c_2\left(e^x \cos(x) + e^x \operatorname{sen}(x)\right) + 5e^{2x}$$

$$\left.\frac{dy}{dx}\right|_{x=0} \Rightarrow -3 = c_1\left(-(1)(0) + (1)(1)\right) + c_2\left((1)(1) + (1)(0)\right) + 5(1)$$

$$-3 = c_1 + c_2 + 5$$

$$4 = c_1 + \frac{5}{2} \qquad c_1 = 4 - \frac{5}{2} \Rightarrow \frac{3}{2}$$

$$-3 = \left(\frac{3}{2}\right) + c_2 + 5 \qquad c_2 = -3 - \frac{3}{2} - 5$$

$$c_2 = -\frac{19}{2}$$

$$\boxed{y_p = \frac{3}{2} e^x \cos(x) - \frac{19}{2} e^x \operatorname{sen}(x) + \frac{5}{2} e^{2x}}$$