EDO(2) L cc H.

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

$$y = e^{mx}$$

$$m^2 + a_1 m + a_2 = 0$$

1.- $m_1 \neq m_2 \in \mathbb{R}$

2.- $m_1 = m_2 \in \mathbb{R}$

3.- $m_{1,2} = a \pm bi \in \mathbb{C}$ $\quad m_1 \neq m_2$

Caso I.- $m_1 \neq m_2 \in \mathbb{R}$

$$\boxed{y_g = C_1 e^{m_1 x} + C_2 e^{m_2 x}}$$

$$W_1 = \begin{vmatrix} e^{m_1 x} & e^{m_2 x} \\ m_1 e^{m_1 x} & m_2 e^{m_2 x} \end{vmatrix} \neq 0$$

CASO III.- $m_1 \neq m_2 \in \mathbb{C}$

$$y_g = C_1 e^{(a+bi)x} + C_2 e^{(a-bi)x}$$

$x \in \mathbb{R}$

$y = \mathbb{R}$

Euler $\quad e^{\pi i} = -1$

$$y_g = e^{ax}\left(C_1 e^{(bx)i} + C_2 e^{(-bx)i}\right)$$

$$e^{wi} = \cos(w) + \operatorname{sen}(w)i$$

$$e^{-wi} = \cos(w) - \operatorname{sen}(w)i$$

$$y_g = e^{ax}\Big(C_1\left(\cos(bx) + \operatorname{sen}(bx)i\right) +$$

$$+ C_2\left(\cos(bx) - \operatorname{sen}(bx)i\right)\Big)$$

$$y_g = e^{ax}\Big(\overbrace{[C_1 + C_2]}^{C_{10}} \cos(bx) + \overbrace{[C_1 i - C_2 i]}^{C_{20}} \operatorname{sen}(bx)\Big)$$

CASO III)

$$y_g = C_{10} e^{ax} \cos(bx) + C_{20} e^{ax} \operatorname{sen}(bx).$$

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0 \qquad \text{EDO(2)LCCH.}$$

$$m^2 - 2m + 2 = 0$$

$$m_{1,2} = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(2)}}{2}$$

$$m_{1,2} = \frac{2 \pm \sqrt{4-8}}{2}$$

$$m_{1,2} = \frac{2 \pm \sqrt{-4}}{2}$$

$$m_{1,2} = \frac{2 \pm 2i}{2} \Rightarrow 1 \pm i$$

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

CASO II.- $m_1 = m_2$

$$y_1 = e^{m_1 x}$$

$$W = \begin{vmatrix} e^{m_1 x} & e^{m_1 x} \\ m_1 e^{m_1 x} & m_1 e^{m_1 x} \end{vmatrix} = 0$$

$$\frac{d}{dm}\left(\begin{array}{l} m^2 + a_1 m + a_2 = 0 \quad m_1 = m_2 \\ 2m + a_1 = 0 \end{array} \right.$$

$$\frac{d}{dm}\left(\begin{array}{l} m^2 + a_1 m + a = 0 \quad m_1 \neq m_2 \\ (m - m_1) + (m - m_2) = 0 \end{array} \right.$$

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

$$m^2 + a_1 m + a_2 = 0 \qquad m_1 = m_2$$

$$y_1 = e^{mx} \xrightarrow{m=m_1} y = e^{m_1 x}$$

$$\frac{\partial}{\partial m}$$

$$y_2 = x e^{mx} \xrightarrow{m=m_1} y = x e^{m_1 x}$$

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

$$y(0) = \frac{\pi}{2}$$