EDO(n) L $\underline{\underline{CC}}$ H

$$\frac{dy}{dx} + a_1 y = 0$$

$$p(x) = a_1$$

$$y_{g/H} = c_1 e^{-\int p(x)dx}$$

$$y = c_1 e^{-a_1\int dx}$$

$$\boxed{y = c_1 e^{-a_1 x}}$$

EDO(1)LccH.

$$y = C e^{-a_1 x}$$

$$\frac{dy}{dx} - 3y = 0$$

$$y = C e^{-(-3)x}$$

$$y = C e^{3x}$$

$$\frac{dy}{dx} = 3Ce^{3x}$$

$$\left[3Ce^{3x}\right] - 3\left[Ce^{3x}\right] = 0$$

$$(3-3)Ce^{3x} = 0$$

$$(0)Ce^{3x} = 0$$

$$\underline{0 \equiv 0}$$

EDO(2)LCCH.

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

H_0:

$$\left.\begin{aligned} y_p &= e^{mx} \\ \frac{dy}{dx} &= me^{mx} \\ \frac{d^2y}{dx^2} &= m^2e^{mx} \end{aligned}\right\} \quad m^2e^{mx} + a_1(me^{mx}) + a_2(e^{mx}) = 0$$

$$(m^2 + a_1 m + a_2)e^{mx} = 0$$

$$\boxed{e^{mx} = 0}$$ SOLUCIÓN INÚTIL

$$\boxed{m^2 + a_1 m + a_2 = 0}$$

ECUACIÓN CARACTERÍSTICA

$$\begin{cases} m_1 \neq m_2 \in \mathbb{R} \\ m_1 = m_2 \in \mathbb{R} \\ \left.\begin{aligned} m_1 &= a + bi \\ m_2 &= a - bi \end{aligned}\right\} \in \mathbb{C} \end{cases}$$

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

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

CASO I.

$$m_1 \neq m_2 \qquad y_1 = e^{m_1 x} \qquad y_2 = e^{m_2 x}$$

$$\boxed{y = c_1 e^{m_1 x} + c_2 e^{m_2 x}}$$

g/H

$$WW = \begin{bmatrix} e^{m_1 x} & e^{m_2 x} \\ m_1 e^{m_1 x} & m_2 e^{mx} \end{bmatrix}$$

$$|WW| \neq 0$$

$$\begin{vmatrix} e^{m_1 x} & e^{m_2 x} \\ m_1 e^{m_1 x} & m_2 e^{m_2 x} \end{vmatrix} = m_2 e^{m_2 x} e^{m_1 x} - m_1 e^{m_1 x} e^{m_2 x}$$

$$= (m_2 - m_1) e^{m_2 x} e^{m_1 x}$$

$$m_2 - m_1 \neq 0$$

$$m_2 \neq m_1$$

$$\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 0$$

CASO I

$$m^2 - 7m + 12 = 0$$

$$(m-4)(m-3) = 0$$

$$m_1 = 4 \quad m_2 = 3$$

$$m_1 \neq m_2$$

$$y = C_1 e^{4x} + C_2 e^{3x}$$

$$\frac{dy}{dx} = 4C_1 e^{4x} + 3C_2 e^{3x}$$

$$\frac{d^2y}{dx^2} = 16C_1 e^{4x} + 9C_2 e^{3x}$$

+

$$[16C_1 e^{4x} + 9C_2 e^{3x}] -$$

$$-7[4C_1 e^{4x} + 3C_2 e^{3x}] +$$

$$+12[C_1 e^{4x} + C_2 e^{3x}] = 0$$

$$(0)C_1 e^{4x} + (0)C_2 e^{3x} = 0$$

$$0 \equiv 0$$

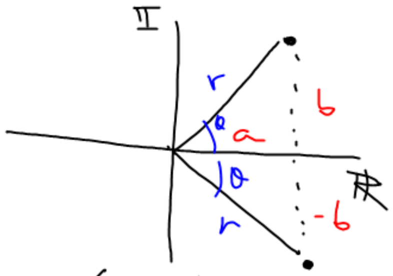
CASO $\underline{III}$ - $m_1, m_2 \in \mathbb{C}$

$$m_1 = a + bi \qquad m_1 \neq m_2$$
$$m_2 = a - bi$$

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

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

$$y_g = C_1 e^{(a+bi)x} + C_2 e^{(a-bi)x} \qquad x \in \mathbb{R}, \; y \in \mathbb{R}$$



$$re^{m_1 x} = r\cos(\theta) + ir\,\text{sen}(\theta)$$
$$re^{m_2 x} = r\cos(\theta) - ir\,\text{sen}(\theta)$$
$$r^2 = a^2 + b^2$$

$$y = C_1 e^{(a+bi)x} + C_2 e^{(a-bi)x} \qquad e^{(a+bi)x} = e^{ax}\cos(bx) + e^{ax}\text{sen}(bx)\,i$$

$$y = C_1\left(e^{ax}\cos(bx) + i e^{ax}\text{sen}(bx)\right) + C_2\left(e^{ax}\cos(bx) - i e^{ax}\text{sen}(bx)\right)$$

$$y = (C_1 + C_2)e^{ax}\cos(bx) + (C_1 i - C_2 i)e^{ax}\text{sen}(bx)$$

$$y = C_{10} e^{ax}\cos(bx) + C_{20} e^{ax}\text{sen}(bx)$$

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

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

$$m = \frac{-2 \pm \sqrt{4 - 4(2)}}{2}$$

$$m = -1 \pm i \qquad \begin{array}{l} a = -1 \\ b = 1 \end{array}$$

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