$$y'' - y = 0$$

EDO(2) L CC H.

$$m^2 - 1 = 0$$

$$(m+1)(m-1) = 0 \qquad m_1 = -1 \qquad m_1 \neq m_2$$

$$m_2 = 1$$

$$y = c_1 e^{-x} + c_2 e^{x}$$

$$3y'' - 2y' - 8y = 0$$

$$y'' - \frac{2}{3}y' - \frac{8}{3}y = 0$$

$$m^2 - \frac{2}{3}m - \frac{8}{3} = 0$$

$$m = \frac{-\left(-\frac{2}{3}\right) \pm \sqrt{\left(-\frac{2}{3}\right)^2 - 4(1)\left(-\frac{8}{3}\right)}}{2(1)}$$

$$m = \frac{\frac{2}{3} \pm \sqrt{\frac{4}{9} + \frac{32}{3}}}{2}$$

$$m = \frac{\frac{2}{3} \pm \sqrt{\frac{4}{9} + \frac{96}{9}}}{2}$$

$$= \frac{\frac{2}{3} \pm \sqrt{\frac{100}{9}}}{2}$$

$$= \frac{\frac{2}{3} \pm \frac{10}{3}}{2} \Rightarrow \left(\frac{6}{3}, -\frac{4}{3}\right) \qquad m_1 \neq m_2$$

$$y = c_1 e^{2x} + c_2 e^{-\frac{4}{3}x}$$

$$y'' + 2y' + y = 0$$

$$m^2 + 2m + 1 = 0$$

$$(m+1)^2 = 0 \qquad m_1 = m_2 = -1$$

$$y = c_1 e^{-x} + c_2 x e^{-x}$$

$$y'' - 4y' + 4y = 0$$

$$m^2 - 4m + 4 = 0$$

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

$$= \frac{4 \pm \sqrt{0}}{2}$$

$$= \frac{4}{2} \Rightarrow 2.$$

$$(m-2)^2 = 0 \longrightarrow m^2 - 4m + 4 = 0$$

CASO II.

$$y = C_1 e^{2x} + C_2 x e^{2x}$$

$$y'' - 3y' + 3y = 0$$

$$m^2 - 3m + 3 = 0$$

$$m = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(3)}}{2(1)}$$

$$m = \frac{3 \pm \sqrt{9 - 12}}{2}$$

$$m = \frac{3 \pm \sqrt{-3}}{2} \Rightarrow \frac{3 \pm \sqrt{3}\, i}{2}$$

$$m_1 = \frac{3}{2} + \frac{\sqrt{3}}{2} i$$

CASO III

$$m_2 = \frac{3}{2} - \frac{\sqrt{3}}{2} i$$

$$a = \frac{3}{2} \qquad a \in \mathbb{R}$$

$$b = \frac{\sqrt{3}}{2} \qquad b \in \mathbb{R}^+$$

$$y(x) = C_1 e^{\frac{3}{2}x} \cos\left(\frac{\sqrt{3}}{2} x\right) + C_2 e^{\frac{3}{2}x} \operatorname{sen}\left(\frac{\sqrt{3}}{2} x\right)$$

Ecuación Dif. Ord. (1) L ~ NH.

$$\frac{dy}{dx} + a_1 y = Q(x)$$

$$y = C_1 e^{-a_1 x} + e^{-a_1 x} \int e^{a_1 x} Q(x)\,dx$$

$$y_{g/nh} = \left[C_1 + \int e^{a_1 x} Q(x)\,dx\right] e^{-a_1 x}$$

$$y_{g/h} = C_1 e^{-a_1 x}$$

$$y_{g/n\text{-}h} = A(x) e^{-a_1 x}$$

$$y' = -a_1 A(x) e^{-a_1 x} + e^{-a_1 x} A'(x)$$

$$\left(-a_1 \cancel{A(x)} e^{-a_1 x} + e^{-a_1 x} A'(x)\right) + a_1 \left(\cancel{A(x)} e^{-a_1 x}\right) = Q(x)$$

$$e^{-a_1 x} A'(x) = Q(x)$$

$$A'(x) = e^{a_1 x} Q(x)$$

$$A(x) = \int e^{a_1 x} Q(x)\,dx + C_1$$

$$y'' + a_1 y' + a_2 y = Q(x)$$

$$y'' + a_1 y' + a_2 y = 0$$

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

$$y_{g/h} = C_1 e^{m_1 x} + C_2 e^{m_2 x}$$

$$y_{g/nh} = A(x) e^{m_1 x} + B(x) e^{m_2 x}$$

$$y' = m_1 A(x) e^{m_1 x} + m_2 B(x) e^{m_2 x} + \underbrace{A'(x) e^{m_1 x} + B'(x) e^{m_2 x}}_{=0}$$

$$y' = m_1 A(x) e^{m_1 x} + m_2 B(x) e^{m_2 x} + (0)$$

$$y'' = m_1^2 A(x) e^{m_1 x} + m_2^2 B(x) e^{m_2 x} + \underbrace{m_1 A'(x) e^{m_1 x} + m_2 B'(x) e^{m_2 x}}_{= Q(x)}$$

$$y'' = m_1^2 A(x) e^{m_1 x} + m_2^2 B(x) e^{m_2 x} + Q(x)$$

$$A'(x)e^{m_1x} + B'(x)e^{m_2x} = 0$$

$$m_1A'(x)e^{m_1x} + m_2B'(x)e^{m_2x} = Q(x)$$