CAP I. → CAP. II

EDO(1) NL → EDO(n) L

MVS
ME
MFI.
MCH.

$M + Ny' = 0$

EDO(1) L CV NH

$y' + p(x)y = q(x)$

$$\boxed{y' + p(x)y = 0}$$

$$FI = e^{\int p(x)dx}$$

$$e^{\int p(x)dx} p(x) y + e^{\int p(x)dx} y' = 0$$

$$\rightarrow y e^{\int p(x)dx} = C. \quad FI$$

$$\rightarrow y = C e^{-\int p(x)dx} \quad VS$$

$$y' + p(x)\,y = q(x) \qquad \text{EDO(1)LC.V. NH.}$$

$$\underbrace{e^{\int p(x)dx}}_{\text{FI.}}\left(y' + p(x)\,y\right) = e^{\int p(x)dx}\,q(x)$$

$$d\left(y e^{\int p(x)dx}\right) = e^{\int p(x)dx}\,q(x)\,dx.$$

$$y e^{\int p(x)dx}\,p(x) + e^{\int p(x)dx}\frac{dy}{dx} = e^{\int p(x)dx}\,q(x)$$

$$e^{\int p(x)dx}\left(y\,p(x) + \frac{dy}{dx}\right) = e^{\int p(x)dx}\,q(x)$$

$$y\,p(x) + \frac{dy}{dx} = q(x)$$

$$\frac{dy}{dx} + p(x)\,y = q(x)$$

$$d\left(y e^{\int p(x)dx}\right) = e^{\int p(x)dx} q(x)\,dx$$

$$\int d\left(y e^{\int p(x)dx}\right) = \int e^{\int p(x)dx} q(x)\,dx + C$$

SG $$y e^{\int p(x)dx} = C + \int e^{\int p(x)dx} q(x)\,dx$$

$$y = C e^{-\int p(x)dx} + \left[e^{-\int p(x)dx} \int e^{\int p(x)dx} q(x)\,dx \right]$$

REGLA DE ORO

EDO(n)L

$$y_{g/NH} = y_{g/H_A} + y_{p/q}$$

EDO(1)L CUNH $\longrightarrow$ $y' + p(x)\,y = q(x)$

EDO(1)L CVH$_A$ $\longrightarrow$ $y' + p(x)\,y = 0$

$$y' + 2x\,y = 2xe^{-x^2}$$

$$y' + 2x\,y = 0 \longrightarrow y' + p(x)\,y = 0$$

$$p(x) = 2x$$

$$\int p(x)dx = 2\int x\,dx \Rightarrow x^2$$

FI $e^{\int p(x)dx} = e^{x^2}$

$$e^{x^2}\left(y' + 2x\,y\right) = e^{x^2}\left(2xe^{-x^2}\right)$$

$$\frac{d}{dx}\left(ye^{x^2}\right) = 2x.$$

SG $\int d\left(ye^{x^2}\right) = \int 2x\,dx + C$

SG $ye^{x^2} = C + x^2$

$$y = Ce^{-x^2} + x^2e^{-x^2}$$

$$y_{g/NH} = y_{g/H_A} + y_{p/g}.$$

56 $y = Ce^{2x} + 5x^3$

EDO(1) L $\left\{\begin{matrix} CV \\ CC \end{matrix}\right\}$ NH.

$$\frac{dy}{dx} + p(x)\,y = q(x)$$

$$\frac{dy}{dx} = 2Ce^{2x} + 15x^2$$

$y = Ce^{2x} + 5x^3 \qquad y - 5x^3 = Ce^{2x}$

$$\boxed{C = \frac{y - 5x^3}{e^{2x}}}$$

$$\frac{dy}{dx} - 15x^2 = 2Ce^{2x}$$

$$C = \frac{\frac{dy}{dx} - 15x^2}{2e^{2x}}$$

$$\frac{\frac{dy}{dx} - 15x^2}{2e^{2x}} = \frac{y - 5x^3}{e^{2x}}$$

$$\frac{dy}{dx} - 15x^2 = 2\left(y - 5x^3\right)$$

$$\frac{dy}{dx} - 2y = -10x^3 + 15x^2$$

$p(x) = -2$

$q(x) = -10x^3 + 15x^2$

EDO(1) L CC NH.

$y = Ce^{2x} + 5x^3$

EDO (n) L $\left\{ \begin{matrix} CC \\ CV \end{matrix} \right\}$ NH.

$$y_{g/NH} = y_{g/H_{(A)}} + y_{p/q(x)}$$

SG $\Rightarrow$ $y = \boxed{c_1 e^{x} + c_2 e^{-x}} + \boxed{2x^2 + 3x^3}$

EDO (2) L $\left\{ \begin{matrix} CC \\ CV \end{matrix} \right\}$ NH.

$$\frac{dy}{dx} = c_1 e^{x} - c_2 e^{-x} + 4x + 9x^2$$

$$\frac{d^2y}{dx^2} = \boxed{c_1 e^{x} + c_2 e^{-x}} + 4 + 18x$$

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

$$\frac{d^2y}{dx^2} = \left(y - 2x^2 - 3x^3\right) + 4 + 18x$$

$$\boxed{\frac{d^2y}{dx^2} - y = -3x^3 - 2x^2 + 18x + 4}$$

$$\frac{d^2y}{dx^2} + a_1(x)\frac{dy}{dx} + a_2(x)y = Q(x)$$

$a_1(x) = 0$ $\quad Q(x) = -3x^3 - 2x^2 + 18x + 4$

$a_2(x) = -1$

EDO (2) L CC NH

$M + N y' = 0$ EDO(1)NL

$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ ES EXACTA.

$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$ NO EXACTA.

F.I. $\Rightarrow$ $\frac{d\mu}{\mu} = \left(\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N} \right) dx$

$M + N y' = 0$

$y' + p(x) y = 0$

$M = p(x) y \quad N = 1$

$\frac{\partial M}{\partial y} = p(x) \quad \frac{\partial N}{\partial x} = 0$ NO EXACTA.

FI $\frac{d\mu}{\mu} = \left(\frac{p(x) - 0}{1} \right) dx$

$\int \frac{d\mu}{\mu} = \int p(x) dx$

$\ln \mu = \int p(x) dx$

$\mu = e^{\int p(x) dx}$