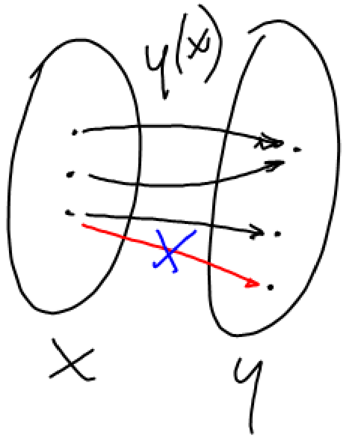
Método del Operador Diferencial

La operación DERIVADA tiene diversas notaciones:



Leibnitz $\frac{dy}{dx}$ $y(x)$

Newton $\dot{y}$ $y(t)$

Diversos $y'(x)$ $y'(t)$ $y'(u)$

Operador Diferencial $D_x y \longrightarrow Dy$

$$D(Dy) \Leftrightarrow D^2 y \qquad D(D^n y) \Leftrightarrow D^{n+1} y$$

$$D^{-1}(Dy) \Leftrightarrow y$$

$$(D + a)y \Leftrightarrow Dy + ay$$

$$D[f+g] \Leftrightarrow Df + Dg$$

Para EDO(n)L cc H el operador

resulta totalmente LINEAL

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 4y = 0$$

$$D^2y - 5Dy + 4y = 0$$

$$(D^2 - 5D + 4)y = 0$$

$$(D-1)(D-4)y = 0$$

$$y_g = c_1e^{x} + c_2e^{4x}$$

$$(D-1)(D-4)\left[c_1 e^{x} + c_2 e^{4x}\right] = 0$$

$$(D-1)\left[c_1 e^{x} + \cancel{4c_2 e^{4x}} - 4c_1 e^{x} - \cancel{4c_2 e^{4x}}\right] = 0$$

$$(D-1)\left[-3c_1 e^{x}\right] = 0$$

$$\left[\cancel{-3c_1 e^{x}} + \cancel{3c_1 e^{x}}\right] = 0 \qquad (D-1)(D-4)y = 0$$

$$0 \equiv 0$$

$$\text{?}$$

$$y_g = C_1 e^{-2x} + C_2 x e^{-2x} + C_3 x^2 e^{-2x}$$

$$\begin{array}{ccccccc} & & & 1 & & & \\ & & 1 & & 1 & & \\ & 1 & & 2 & & 1 & \\ 1 & & 3 & & 3 & & 1 \end{array}$$

$$(D+2)^3 y = 0$$

$$(D^3 + 6D^2 + 12D + 8)y = 0 \qquad m_1 = m_2 = m_3 = -2$$

$$\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 12\frac{dy}{dx} + 8y = 0 \qquad (m+2)^3 = 0$$

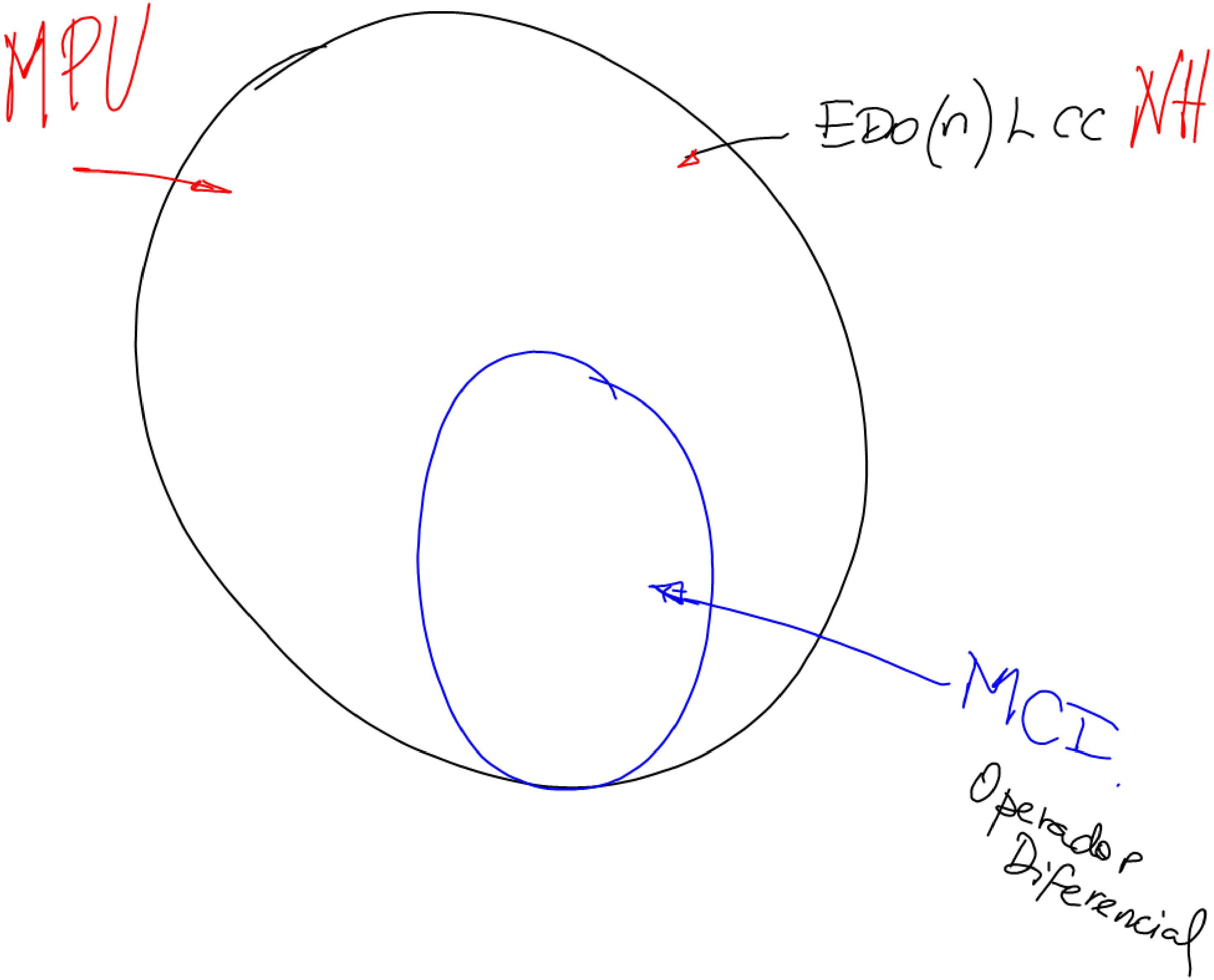
$$(D^3 - 64)y = 0 \qquad (a^3 \pm b^3) = (a \pm b)(a^2 \mp ab + b^2)$$

$$(D-4)(D^2 + 4D + 16)y = 0$$

$$(D-4)(D+2+2\sqrt{3}i)(D+2-2\sqrt{3}i)y = 0$$

$$y_g = C_1 e^{4x} + C_2 e^{-2x}\cos(2\sqrt{3}x) + C_3 e^{-2x}\operatorname{sen}(2\sqrt{3}x)$$

$$\frac{d^3y}{dx^3} - 64y = 0$$


MPU
EDO(n)LCC NH
MCI.
Operador Diferencial