Clase Tema 1. repaso FACTOR INTEGRANTE.

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

- FORMA 1 – VARIABLES SEPARABLES
- " 2 – COEFICIENTES HOMOGÉNEOS
- " 3 – EXACTA.
- " 4 – FACTOR INTEGRANTE.

$$M(x,y) + N(x,y)\,y' = 0$$

$$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x} \quad - \text{ E. No es EXACTA.}$$

"mu" $\mu(x,y)$ factor integrante, tal que

$$\mu(x,y)M(x,y) + \mu(x,y)N(x,y)\,y' = 0$$

entonces será exacta.

$$\frac{\partial \mu M}{\partial y} = \frac{\partial \mu N}{\partial x} \quad \text{EXACTA.}$$

$$\frac{\partial \mu}{\partial y} M + \mu \frac{\partial M}{\partial y} = \frac{\partial \mu}{\partial x} N + \mu \frac{\partial N}{\partial x}$$

EDenDPL(1) Tema 4.

Simplificación $\begin{cases} \mu(x) \\ \mu(y) \end{cases}$

$\mu(x)$

$$(0)\,M + \mu(x)\frac{\partial M}{\partial y} = \frac{d\mu}{dx} N + \mu(x)\frac{\partial N}{\partial x}$$

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

$$\frac{d\mu}{\mu} = \underbrace{\left(\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right)}_{f(x)} dx$$

$$\int \frac{d\mu}{\mu} = \int f(x)\,dx \qquad \mu(x)$$

$\mu(y)$

$$\frac{d\mu}{dy} M + \mu(y)\frac{\partial M}{\partial y} = (0)N + \mu(y)\frac{\partial N}{\partial x}$$

$$\frac{d\mu}{dy} = \mu(y)\left(\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}\right)$$

$$\frac{d\mu}{\mu} = \left(\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}\right)dy$$

$g(y)$

$$\int \frac{d\mu}{\mu} = \int g(y)\,dy \qquad \mu(y) \text{ F.I.}$$

$$(x^4 Lx - 2xy^3) + (3x^2y^2)y' = 0 \qquad \text{EDO(1)NL.}$$

$M \qquad N$

$$\frac{\partial M}{\partial y} = -6xy^2 \qquad \frac{\partial N}{\partial x} = 6xy^2 \qquad \frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$$

NO EXACTA.

$\mu(x) \Rightarrow$

$$\frac{d\mu}{\mu} = \left(\frac{-6xy^2 - 6xy^2}{3x^2y^2}\right)dx$$

$$= -4\left(\frac{xy^2}{x^2y^2}\right)dx$$

$$\frac{d\mu}{\mu} = -\frac{4}{x}\,dx$$

$$\int \frac{d\mu}{\mu} = -4\int \frac{dx}{x}$$

$$L\mu = -4\,Lx$$

$$L\mu = L\left(\frac{1}{x^4}\right)$$

$$\mu(x) = \frac{1}{x^4}$$

$$\frac{1}{x^4}\left(x^4 Lx - 2xy^3\right) + \frac{1}{x^4}\left(3x^2y^2\right)y' = 0$$

$$\left(Lx - \frac{2y^3}{x^3}\right) + \frac{3y^2}{x^2}\, y' = 0$$

$$\underset{MM}{} \qquad \underset{NN}{}$$

$$\frac{\partial MM}{\partial y} = -\frac{6y^2}{x^3} \qquad \frac{\partial NN}{\partial x} = -\frac{6y^2}{x^3}$$

$$\frac{\partial MM}{\partial y} = \frac{\partial NN}{\partial x} \quad \text{EXACTA.}$$

$$\left[\int MM\,dx\right] \cup \left[\int NN\,dy\right] = C_1$$

$$\int MM\,dx = \int Lx\,dx - 2y^3\int\frac{dx}{x^3}$$

$$= xLx - \int dx - 2y^3\left(\frac{-1}{2x^2}\right)$$

$u = Lx \quad dv = dx$

$du = \frac{1}{x}dx \quad v = x$

$$= xLx - x + \frac{y^3}{x^2}$$

$$\int NN\,dy = \frac{3}{x^2}\int y^2\,dy$$

$$= \frac{y^3}{x^2}$$

SOL GRAL $\quad xLx - x + \frac{y^3}{x^2} = C_1$

$$\frac{d}{dx}\int NN\,dy = -2\frac{y^3}{x^3}$$

$$MM - \frac{\partial}{\partial x}\int NN\,dy = \underbrace{\left(Lx - \frac{2y^3}{x^3}\right)}_{MM} - \underbrace{\left(-\frac{2y^3}{x^3}\right)}_{\frac{d}{dx}\int NN\,dy}$$

$$\int\left(MM - \frac{\partial}{\partial x}\int NN\,dy\right)dx = \int Lx\,dx$$

$$= xLx - x$$

SOL GRAL $\rightarrow \quad \frac{y^3}{x^2} + xLx - x = C_1$

EDO(1) L.CV.NH.

$$a_0(x)\frac{d^n y}{dx^n}+a_1(x)\frac{d^{n-1}y}{dx^{n-1}}+\cdots\cdots+a_{n-1}(x)\frac{dy}{dx}+a_n(x)y=Q(x).$$

EDOL(n) CVNH.

$$a_0(x)\frac{dy}{dx}+a_1(x)y=Q(x).$$

EDOL(1) CVNH.

$$\frac{dy}{dx}+\frac{a_1(x)}{a_0(x)}y=\frac{Q(x)}{a_0(x)}$$

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

$$y=C_1e^{-\int p(x)dx}+e^{-\int p(x)dx}\int e^{\int p(x)dx}q(x)\,dx.$$

$$y_{g/n.H}=y_{g/H.}+y_{p/q.}$$

$$\underbrace{y}_{g/n.h.}=\underbrace{C_1e^{2x}+C_2e^{3x}}_{y_{g/h.}}+\underbrace{5e^{4x}+x^2}_{y_{p/q.}}$$ EDOL(2)CCNH.

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

$$p(x) = 2x$$
$$q(x) = 2xe^{-x^2}$$

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

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

$$y = c_1e^{-x^2} + e^{-x^2}\int e^{x^2}\cdot(2xe^{-x^2})dx$$
$$y = c_1e^{-x^2} + e^{-x^2}\int 2x\,dx$$
$$y = c_1e^{-x^2} + x^2e^{-x^2}$$