CLASE 21 SEPT 2021

ED
- ORDINARIAS
  - 1^{er} ORDEN CAP. I
    - No LINEALES — $M + N\frac{dy}{dx} = 0$
    - LINEALES CLASE HOY.
  - orden sup. CAP. II - III
- PARCIALES - CAP IV

IDOL(1) CV. NH.

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

CV — CV — función No Homogenea

Si dividimos toda la ED por $a_0(x)$

$$(1)\quad \frac{dy}{dx} + \frac{a_1(x)}{a_0(x)}y = \frac{Q(x)}{a_0(x)}$$

normalizar la ED.

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

$$\frac{dy}{dx} + p(x)y = 0$$ Ecuación Homogénea Asociada

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

$$N(x,y) = 1 \qquad M(x,y) = p(x)\cdot y$$

$$\frac{\partial N}{\partial x} = 0 \qquad \frac{\partial M}{\partial y} = p(x)$$ ∴ No es exacta

factor integrante $\mu(x)$ sólo depende de "x"

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

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

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

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

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

FACTOR INTEGRANTE: $$\mu(x) = e^{\int p(x)\,dx}$$

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

$$N(x,y) = e^{\int p(x)dx} \qquad M(x,y) = p(x)e^{\int p(x)dx}\cdot y$$

$$\frac{\partial N}{\partial x} = e^{\int p(x)dx}\frac{d}{dx}\int p(x)dx \qquad \frac{\partial M}{\partial y} = p(x)e^{\int p(x)dx}$$

$$\frac{\partial N}{\partial x} = p(x)e^{\int p(x)dx} \quad //$$ ES EXACTA. !

$$e^{\int p(x)dx}dy + \left(p(x)e^{\int p(x)dx}\cdot y\right)dx = 0$$

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

$$e^{\int p(x)dx}\cdot y = C$$

$$\boxed{y = Ce^{-\int p(x)dx}}$$

SOLUCIÓN GENERAL EDOL(1)H.

$$\frac{dy}{dx} + p(x)y = 0$$

por Variables separables

$$\frac{dy}{y} = -p(x)dx$$

$$\int\frac{dy}{y} = -\int p(x)dx$$

$$\ln y = -\int p(x)dx + \underline{\underline{C_1}} \leftarrow$$ constante de integración indefinida

$$y = e^{-\int p(x)dx + C_1} \Rightarrow e^{C_1}e^{-\int p(x)dx}$$

$$\boxed{y = Ce^{-\int p(x)dx}}$$

$$\frac{dy}{dx} - \frac{y}{x} = 0 \qquad p(x) = -\frac{1}{x}$$

$$\int p(x)\,dx = -\int \frac{dx}{x}$$

$$= -Lx$$

$$-\int p(x)\,dx = Lx$$

$$y = Ce^{-\int p(x)dx}$$

$$y = Ce^{Lx}$$

$$\boxed{y = Cx}$$ SOLUCIÓN GENERAL

EDOL(1)CV NH

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

para resolverla

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

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

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

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

SG – EDOL(1)CV NH.

$y_{p/q}$

SG - HAsociada $y_{g/H} = C\, e^{-\int p(x)dx}$

SG - NH. $y_{g/NH} = y_{g/H} + y_{p/q}$

TODAS LAS EDOL