Clase del 7 Diciembre.

Publicar los promedios finales:

a) los estudiantes exentos de examen final con su calificación semestral

b) los estudiantes no exentos con su promedio.

El primer final será el martes 14 a la hora de clase en la plataforma Yeira. a las 11:00 hs

El segundo final será el martes 11 de enero de 2022. a las 11:00 hs.

Repaso

EDO(1) NL ⟶ Exacta.

$$M + N\frac{dy}{dx} = 0$$

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

Sol. gral: $\int M\,dx + \int \left[N - \frac{\partial}{\partial y}\int M\,dx\right]dy = C_1$

No Exacta con factor integrante

$$M + N\frac{dy}{dx} = 0$$

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

$$\mu M + \mu N\frac{dy}{dx} = 0 \quad \text{EXACTA.}$$

μ es el factor integrante

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

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

si $\mu(x)$

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

$$\frac{d\mu(x)}{dx} = \frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)\mu(x)$$

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

$f(x)$.

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

$\mu(x)$

EDO(1) L cyH.

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

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

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

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

$$\ln y = -\int p(x)dx + C$$

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

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

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

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

$$\frac{\partial M}{\partial y} = p(x) \qquad \frac{\partial N}{\partial x} = 0 \qquad \frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$$

NO EXACTA.

$$f(x) = \left(\frac{p(x) - (0)}{1}\right) = p(x)$$

F.I $$\int \frac{d\mu}{\mu} = \int f(x)\, dx$$

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

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

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

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

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

$$\frac{\partial M\mu}{\partial y} = p(x)e^{\int p(x)dx} \qquad \text{EXACTA}$$

$$= C_1$$

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

$$\int M\mu\, dx + \int\left[N\mu - \frac{\partial}{\partial y}\int M\mu\, dx\right]dy$$

$$y\, e^{\int p(x)dx} = C_1$$

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

EDO(1) LCVNH.

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

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

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

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

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

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

LINEALES $y_{g/NH} = y_{g/H} + y_{p/q}$

Tema II.- EDOL(n)CC $\begin{cases} H \\ NH. \end{cases}$

Homogénea

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = 0 \qquad y_H = e^{mx}$$

Ec. Caract. $m^2 + a_1 m + a_2 = 0 \qquad m_1 \quad m_2$

Caso I.- $m_1 \neq m_2 \in \mathbb{R}$

Caso II.- $m_1 = m_2 \in \mathbb{R}$

Caso III.- $m_1, m_2 \in \mathbb{C}$.

Caso I.- $y_g = C_1 e^{m_1 x} + C_2 e^{m_2 x}$

Caso II.- $y_g = C_1 e^{m_1 x} + C_2 x e^{m_1 x}$

Caso III.- $m_1, m_2 = a \pm bi \qquad a \in \mathbb{R}, \; b \in \mathbb{R}^+$

$$y_g = C_1 e^{ax}\cos(bx) + C_2 e^{ax}\operatorname{sen}(bx).$$

LINEAL NO HOMOGÉNEA

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

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = 0$$

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

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

método coef variables

$$\begin{bmatrix} e^{m_1 x} & e^{m_2 x} \\ m_1 e^{m_1 x} & m_2 e^{m_2 x} \end{bmatrix} \begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ Q(x) \end{bmatrix}$$

$A'(x) \quad B'(x)$