TEMA 3.- Matriz exponencial.

SERIE 3. Entregar 15 MAYO

SERIE 4: SUBIR 14 → ENTREGAR 21

EXAMEN PARCIAL 2 ⇒ TEMAS 3 & 4 → 23 MAYO.

$$\frac{d\bar{x}}{dt} = A\bar{x} \qquad \bar{x} = e^{At}\bar{x}(0)$$

$$\frac{d}{dt}\bar{x} = A\bar{x}(t) + \bar{b}(t)$$

$$\bar{x} = e^{At}\bar{x}(0) + \int_0^t \underline{e^{(t-\tau)}}\,\bar{b}(\tau)\,d\tau$$

TEMA 4 : ECUACIÓN DIFERENCIAL EN DERIVADAS PARCIALES

$$F\Big(\underbrace{x, y}_{\text{dos ó más var. independ.}}, z(x,y), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial y^2}, \frac{\partial^2 z}{\partial x \partial y}, \ldots\Big) = 0$$

incognita

$$\frac{\partial^2 z}{\partial x^2} + 8\frac{\partial^2 z}{\partial y^2} = 0$$

orden = 2

$$\underset{g}{z(x,y)} = F_1(x,y) + F_2(x,y)$$

$$z = f(y+mx)$$

$$\frac{\partial z}{\partial x} = f' \cdot m \qquad \frac{\partial z}{\partial y} = f' \cdot (1)$$

$$\frac{\partial^2 z}{\partial x^2} = f'' m^2 \qquad \frac{\partial^2 z}{\partial y^2} = f'' \cdot (1)$$

$$f'' \cdot m^2 + 8f'' = 0$$

$$(m^2+8)f'' = 0 \qquad f''(y+mx) = 0$$

$$m^2 + 8 = 0 \qquad f'(y+mx) = c_1$$

$$m^2 = -8 \qquad \cancel{f(y+mx) = c_1(y+mx) + c_2}$$

$$m_{1,2} = \pm\sqrt{8}\,i$$

INÚTIL.

$$\boxed{z(x,y) = F_1(y+\sqrt{8}i\,x) + F_2(y-\sqrt{8}i\,x).}$$

$$\frac{\partial^2 z}{\partial x^2} + 4\frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = 0$$

	TEMARIO	REAL
EDO	80%	20%
RD en DP	20%	80%.

Método de Variables Separables

· Prueba y error

H_0 · $z(x,y) = F(x) * G(y)$

$$\frac{\partial^2 z}{\partial y^2} - 6\frac{\partial^2 z}{\partial x \partial y} + 8\frac{\partial z}{\partial x} = z$$

$$z = F \cdot G$$

$$\frac{\partial z}{\partial y} = FG' \qquad \frac{\partial z}{\partial x} = F' \cdot G$$

$$\frac{\partial^2 z}{\partial y^2} = FG'' \qquad \frac{\partial^2 z}{\partial x \partial y} = F' \cdot G'$$

$$FG'' - 6F'G' + 8F'G = FG$$

$$FG'' - FG = 6F'G' - 8F'G$$

$$F(G'' - G) = F'(6G' - 8G)$$

$$\frac{G'' - G}{6G' - 8G} = \frac{F'}{F}$$

$$\frac{F'}{F} = \alpha \qquad \frac{G'' - G}{6G' - 8G} = \alpha$$

$\alpha = 0$

$$\frac{F'}{F} = 0 \qquad F' = 0 \qquad \boxed{F(x) = C_1}$$

$$\frac{G'' - G}{6G' - 8G} = 0 \qquad G'' - G = 0$$

$$m^2 - 1 = 0$$

$$m = \pm 1$$

$$G(y) = C_1 e^{y} + C_2 e^{-y}$$

$$z(x,y) = C_{10}\left(C_1 e^{y} + C_2 e^{-y}\right)$$

$$\boxed{z(x,y)_{\alpha=0} = C_{100} e^{y} + C_{200} e^{-y}}$$

para $\alpha > 0$ $\quad \alpha = +\beta^2 \quad \forall \beta \neq 0 \in \mathbb{R}$

$$\frac{F'}{F} = \beta^2 \qquad F' = \beta^2 F \qquad F' - \beta^2 F = 0$$

$$m - \beta^2 = 0$$

$$m = \beta^2$$

$$F(x) = C_1 e^{\beta^2 x}$$

$$\frac{G'' - G}{6G' - 8G} = \beta^2 \qquad G'' - G = \beta^2 (6G' - 8G)$$

$$G'' - G - 6\beta^2 G' + 8\beta^2 G = 0$$

$$G'' - 6\beta^2 G' + (8\beta^2 - 1) G = 0$$

$$m^2 - 6\beta^2 m + (8\beta^2 - 1) = 0$$

$$m_1 = \frac{6\beta^2 + \sqrt{36\beta^4 - 32\beta^2 + 4}}{2}$$

$$m_2 = \frac{6\beta^2 - \sqrt{36\beta^4 - 32\beta^2 + 4}}{2}$$

$$G(y) = C_1 e^{m_1 y} + C_2 e^{m_2 y}$$

$$Z(x,y) = e^{\beta^2 x} \left(C_{10} e^{m_1 y} + C_{20} e^{m_2 y} \right)$$

$\alpha > 0$