Rec E'had Ex: as of the mony impartant copplications of the solving higher order linear deferential Equantum. with Constant Coefficient. It typical Example: i y sa fleretan' of t includes y, yprime, and all he way to it, 3rd det derivative. Shore the Egnation glor its general Souther: : Obsterential Equation: y"+2g'-y'-2g=0 usus the nettod of monthix. which natrix should we be workywith. Adler hat we also weld to say Sanethy about the Exponential of Morting (At)

ford out he glist column to he mo Exp (At).	try Exponential (2)
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Exp(At).	
nother to lA	
Lets put this problem into LA.	
he giden is to put y", y'a	July as vector:
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$\Gamma u u \gamma$	
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The state of the s	
$\mathcal{U}(\mathcal{L})$	
heutes u, what's u!?	
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Production of the state of the	
The first process of the	
$\mathcal{U}'(\mathcal{F}) = \{ (x,y) \in \mathcal{F} : (x,$	
inte u a natrix.	

ulates A: unto matrix, by in comparating the deprecental Equation P

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Tuther;

 $Q'(t) = A \cdot Q(t)$ 

Lets some be above Equation

we need me & Wand & Veglor A (notion) we need to complete the det of the flatlay:  $\det(A-\lambda I) = \det\begin{pmatrix} -2-\lambda & 1\\ 1-\lambda & 1 \end{pmatrix}$  $\Rightarrow (1-1)(1+1)(2+1)$  $X_1 = (1,1,1)^T$  lastow (

Now we have everyty to create to Genal Wurker for u(t).

Grandoswan for U(t)
$$Y(t) = C_1 e^{t} x_1 + C_2 e^{t} x_3 + C_3 e^{2t} x_3$$

$$Y(t) = C_1 e^{t} + C_3 e^{t} + C_3 e^{2t} x_3$$

$$Y(t) = C_1 e^{t} + C_3 e^{t} + C_3 e^{2t} x_3$$

$$Xp(At) = product & Pree matrices:$$

$$= Se^{\Lambda t} S^{-1}$$

$$S = \left[ x_1, x_2, x_3 \right] = \left[ \frac{1}{1-1-2} \right] e^{\Lambda t} \left[ \frac{e^{t}}{e^{2t}} \right]$$

$$Exp(At) = \left[ e^{t} x_1 e^{t} x_2 e^{-2t} \right] \left[ \frac{t}{6} \right]$$

$$\frac{1}{3} = \left[ \frac{1}{3} \right] \left[ \frac{1}{3} \right]$$

$$\begin{cases} -1 & \text{det } C^{T} = 1 \\ \text{det } S = 6 \\ 2 & \text{det } S \end{cases}$$

 $\frac{\exp(At)}{6} = \frac{et}{6} = \frac{et}{2} = \frac{et}{3} = \frac{et}{3}$ 

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