Lecture 20 (May 18th)

Today's Lecture : Non-Hom Systems of D.E.S.

X = A X + D Normal Form"

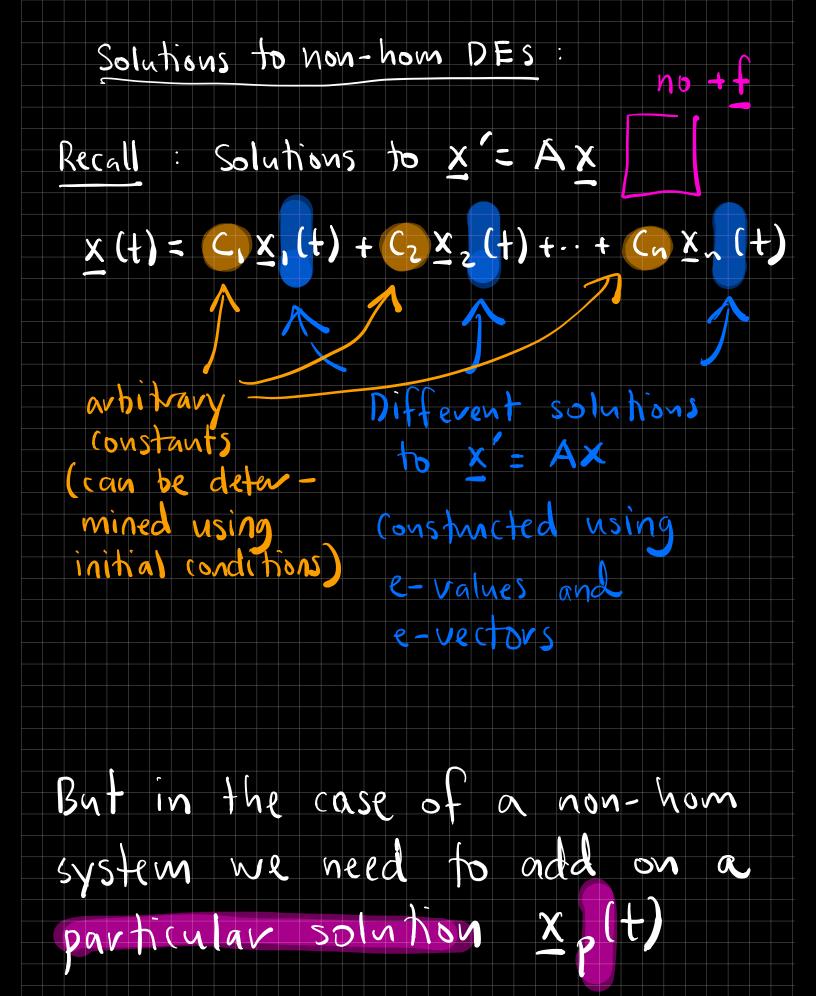
 $if \underline{f}(t) = \begin{pmatrix} f_{1}(t) \\ \vdots \\ f_{n}(t) \end{pmatrix} = \underbrace{\circ}_{n} the system is called "homogeneous"$ 

 $if \underline{f}(t) = \begin{pmatrix} f_{1}(t) \\ f_{n}(t) \end{pmatrix} \neq \underline{\bigcirc} \quad \text{the system is called} \\ \begin{pmatrix} f_{n}(t) \\ f_{n}(t) \end{pmatrix} \neq \underline{\bigcirc} \quad \text{the system is called} \\ \\ \begin{pmatrix} non-homogeneous \\ non-homogeneous \end{pmatrix}$ 

To solve these types of systems we will use one of two methods:

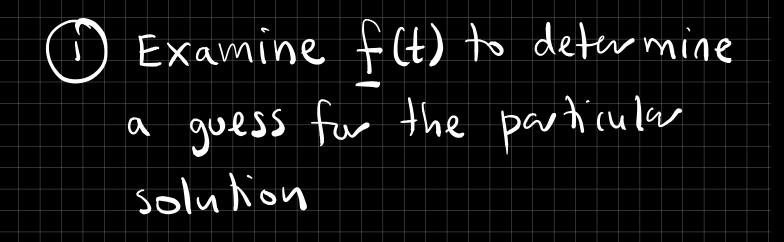
D Method of undet coeff

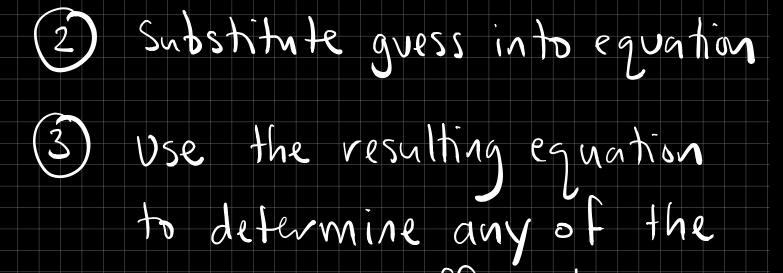
2) Variation of parameters



The goal of the method of undetermined coeff is to find this particular solution

#### General Outline

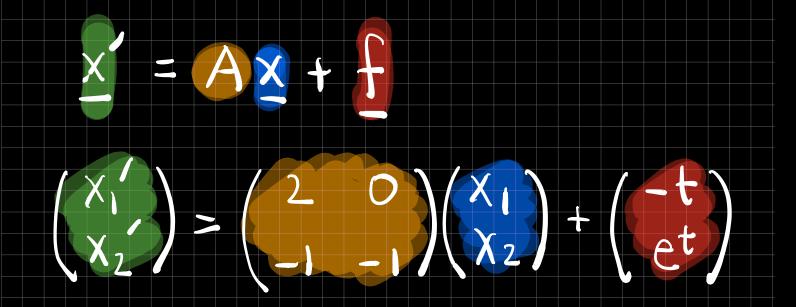




unknown coefficients

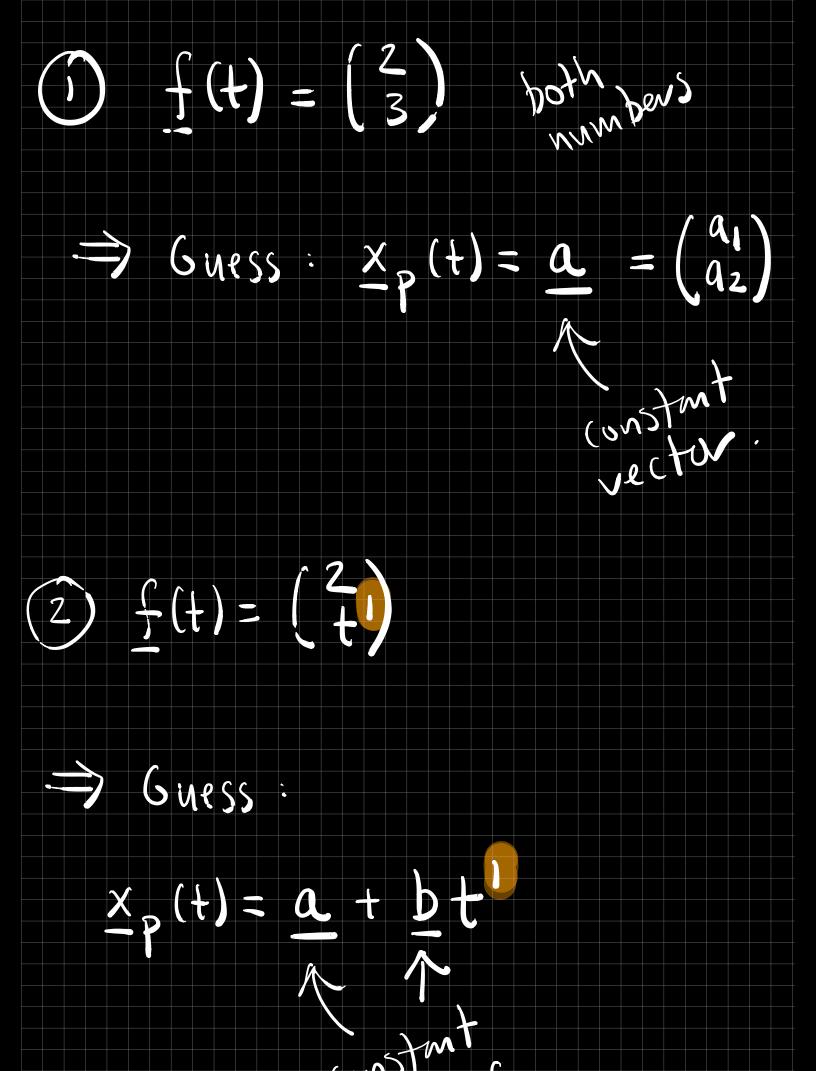
Examples

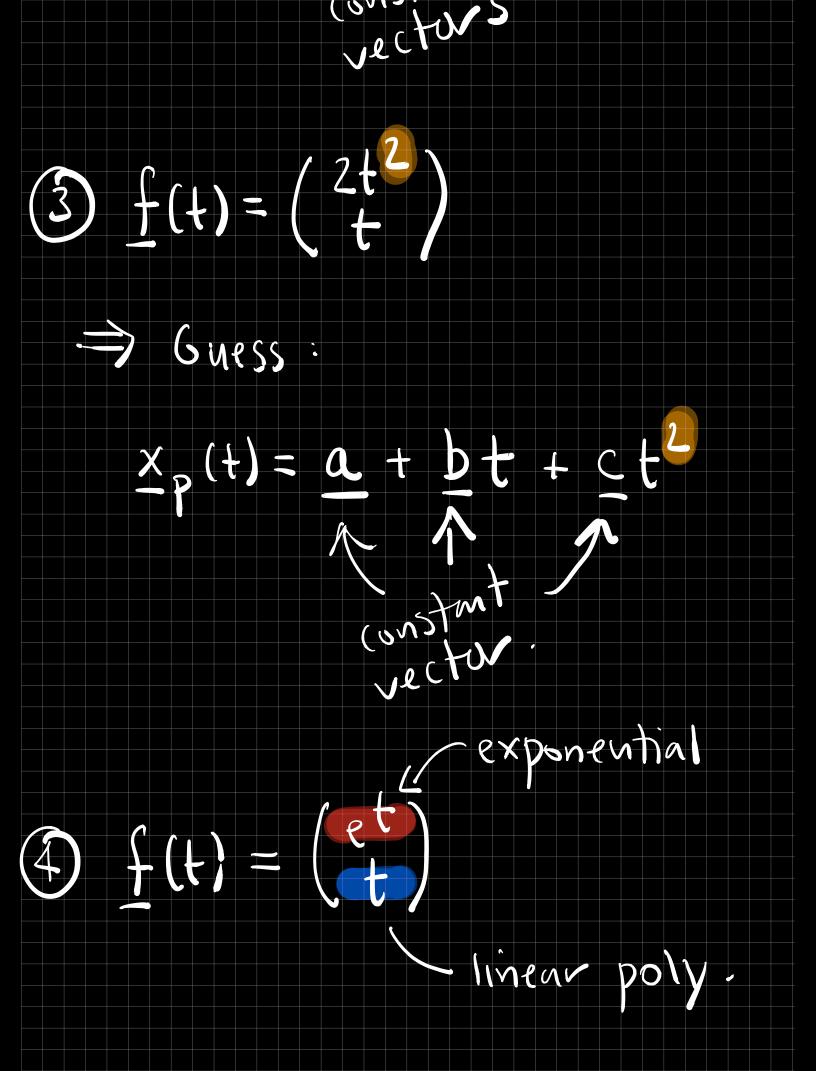
#### $x_{1}(t) = 2x_{1}(t) - t$ $x_{2}(t) = -x_{1}(t) - x_{2}(t) + e^{t}$

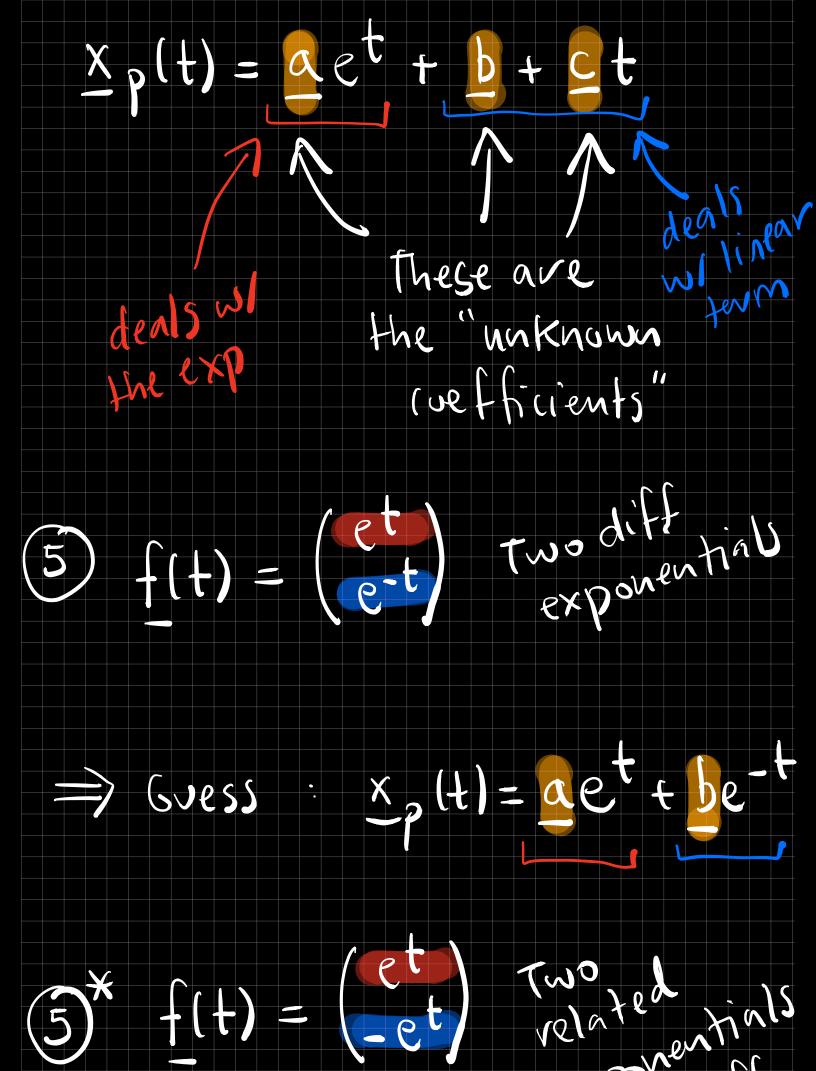


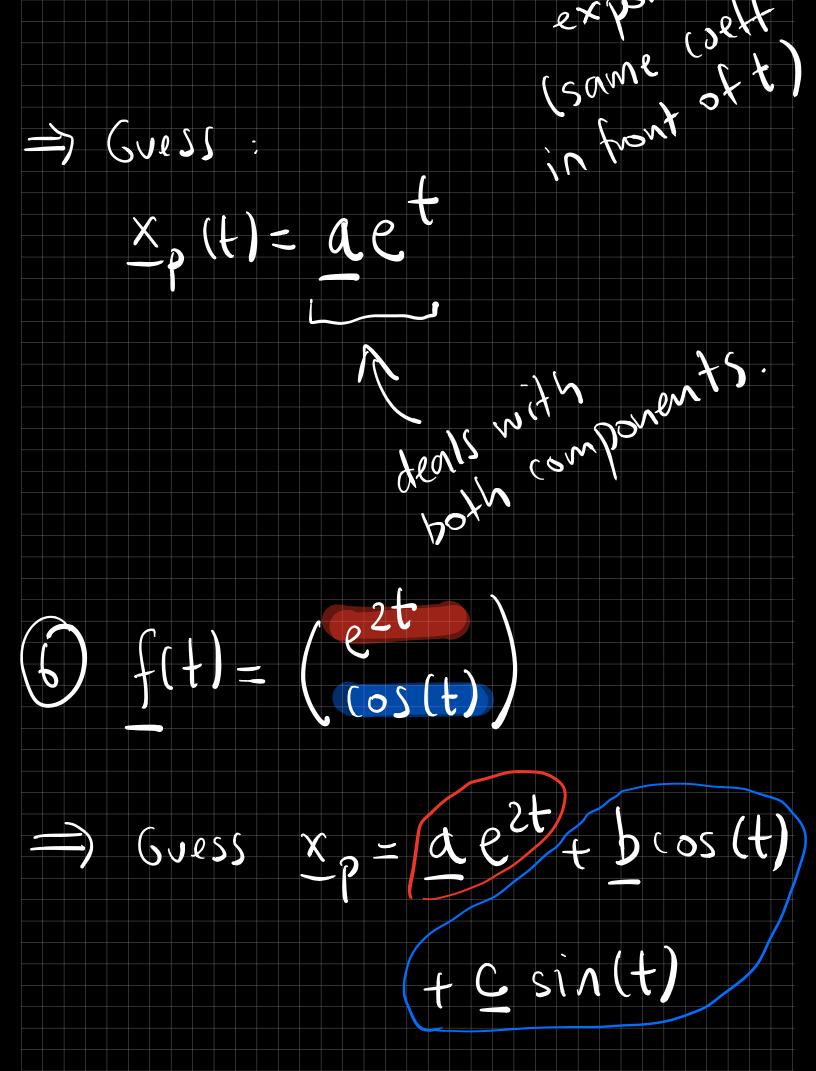
### Depending on f(t) we make

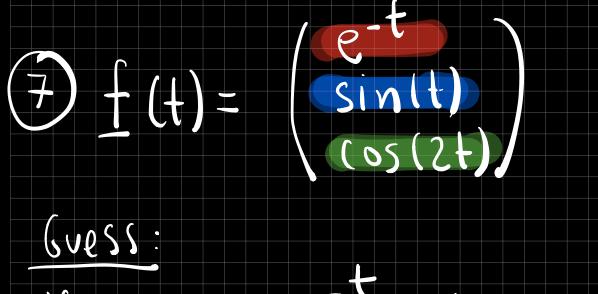
a guess for  $x_p(t)$ 





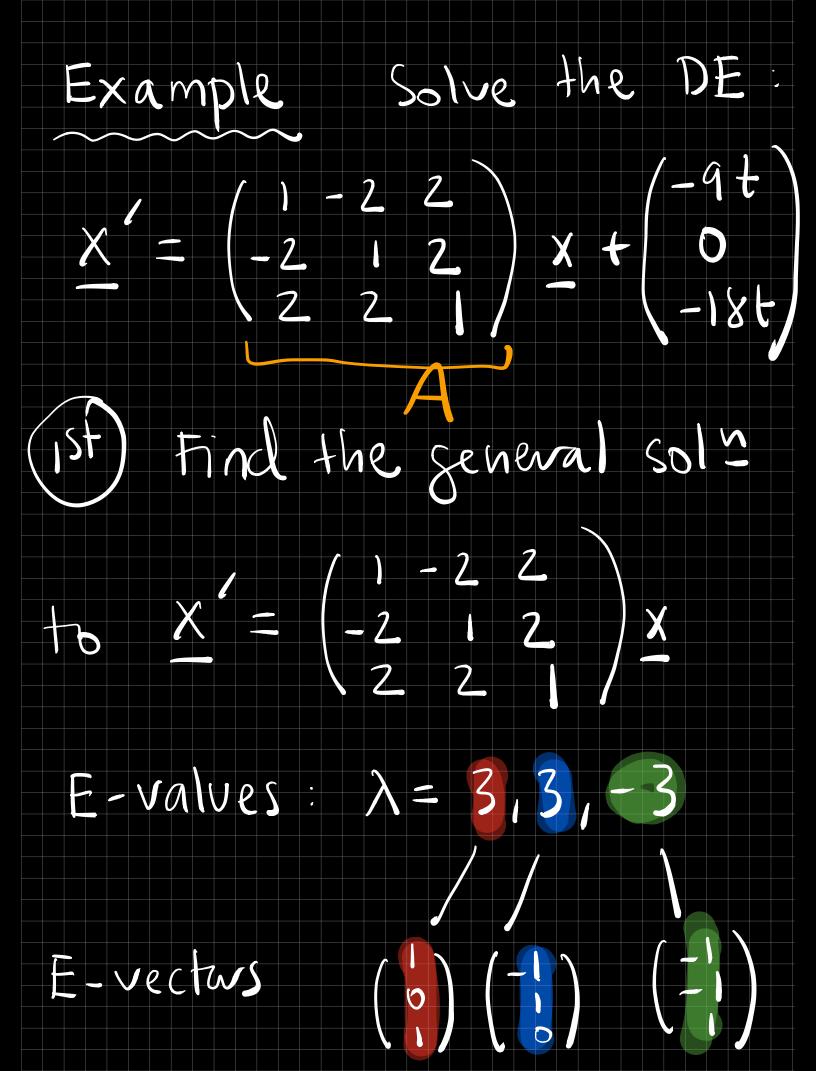


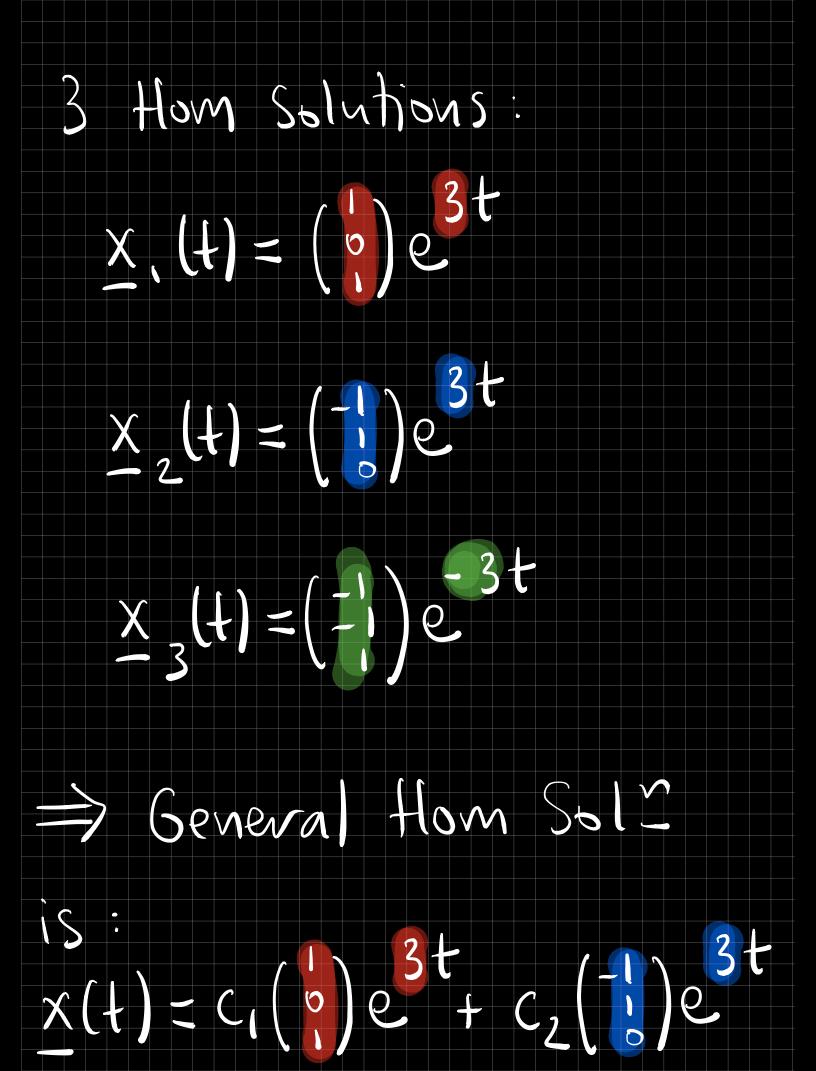


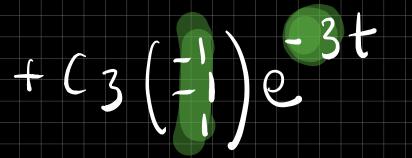


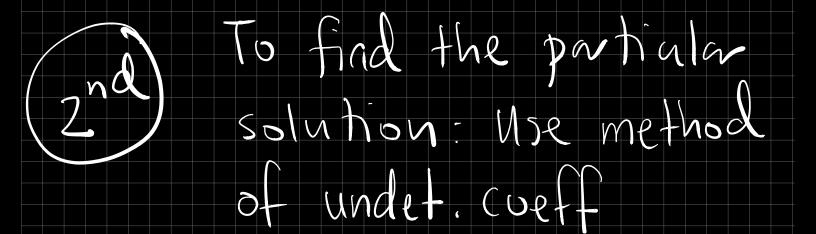
## $\frac{X}{P}(t) = \alpha e^{-t} + b \sin(t) + c \cos(t)$

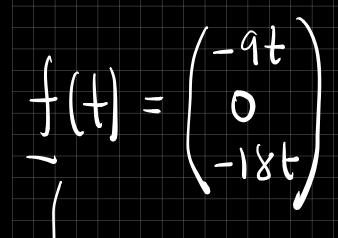
### $+ d\cos(2t) + e\sin(2t)$







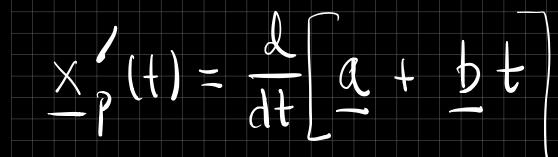


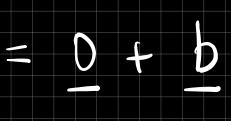


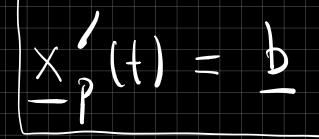


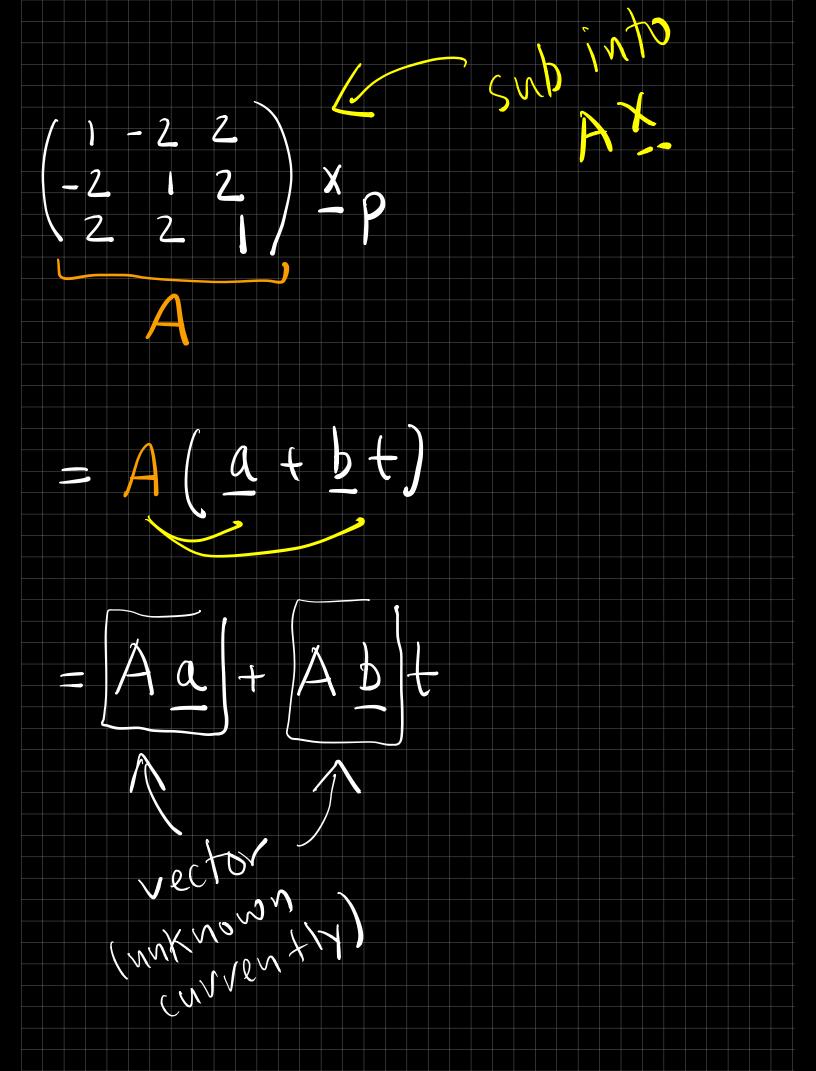


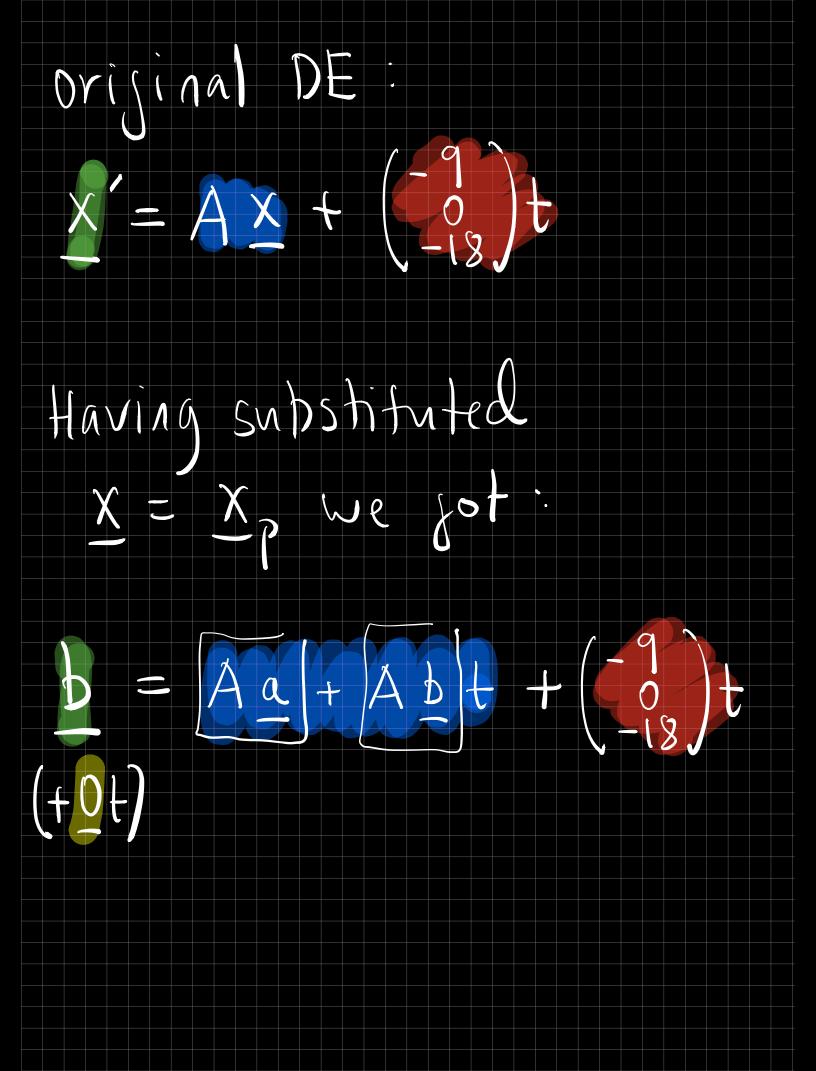
## Now subjinto the DE(X = Xp)(will need to diff x before we (an sub.)



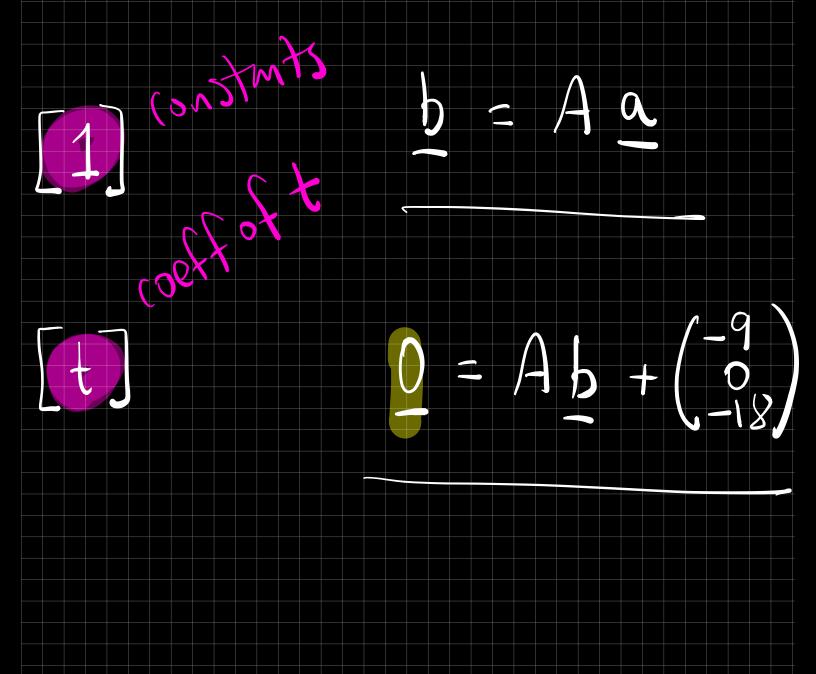


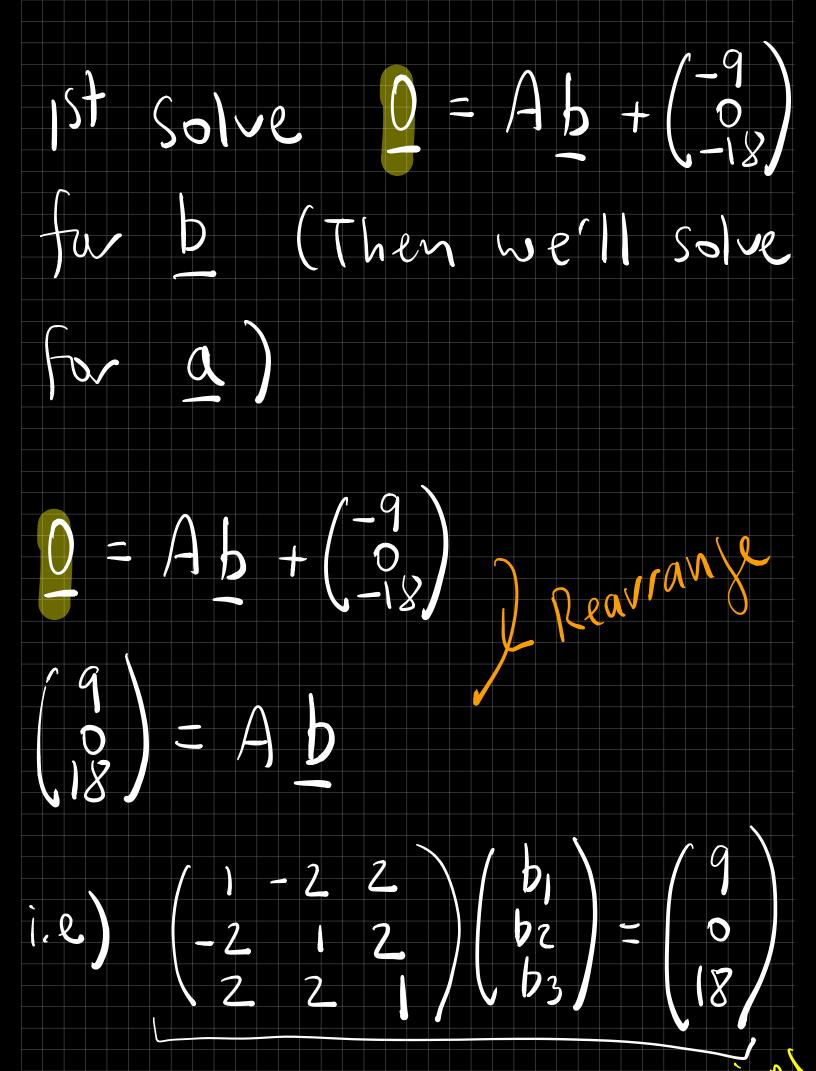


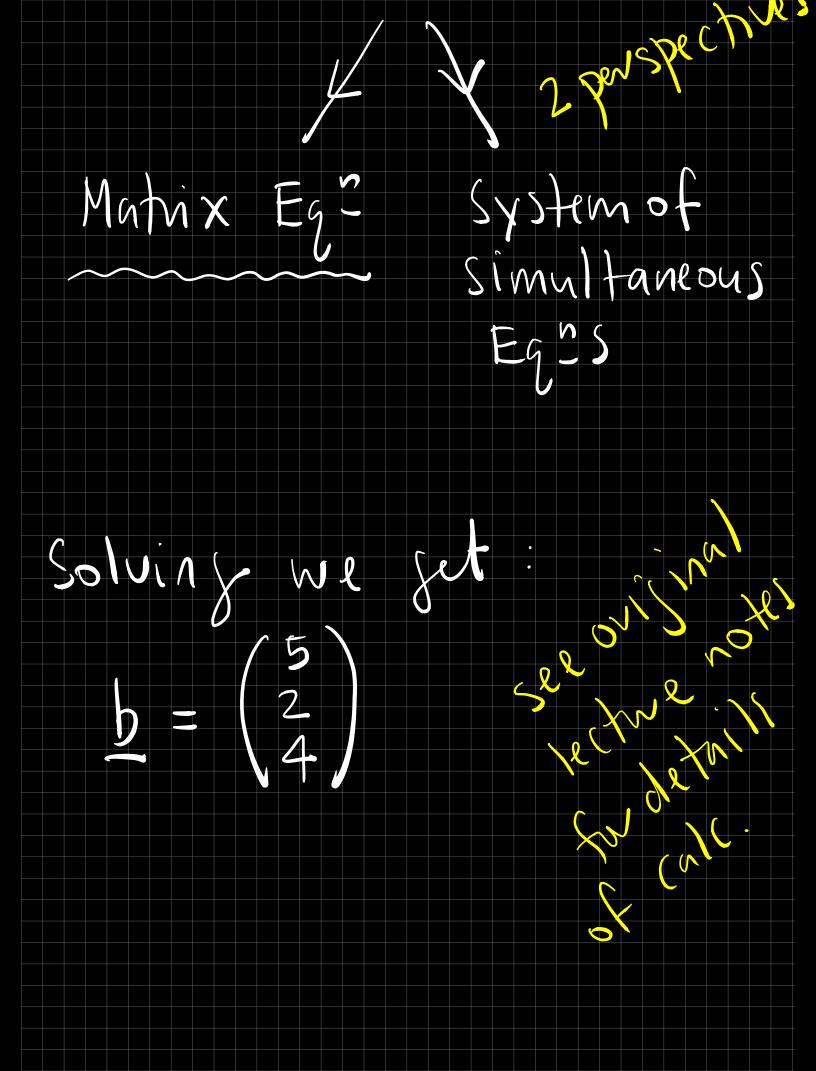


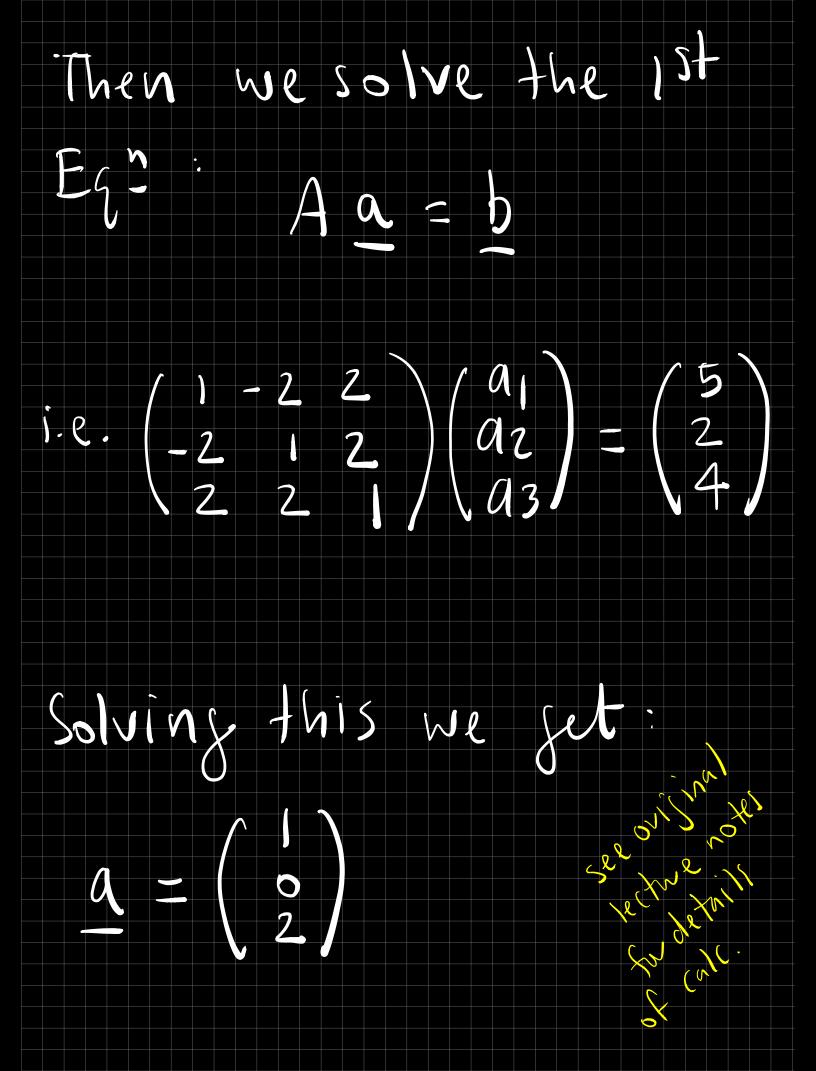


# compare coefficients on both sides of eq2:

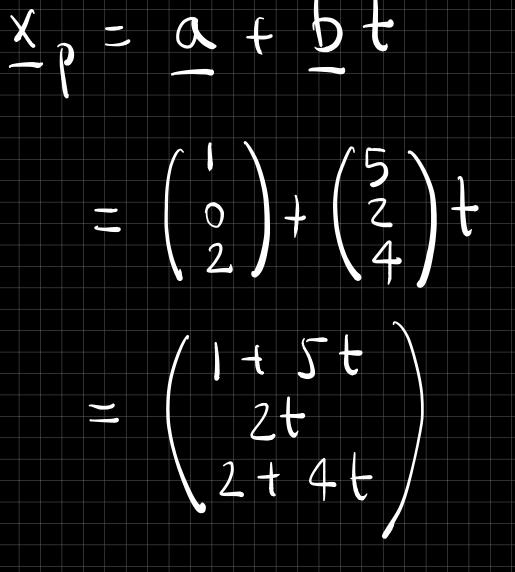




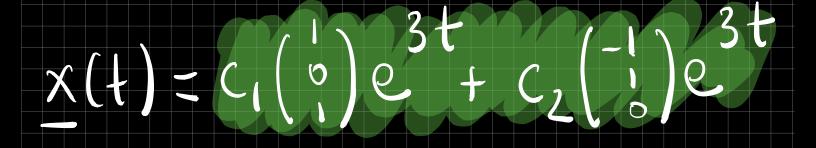




#### That means that



#### General Non-Hom Sol-:



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