

Continue examples of linear systems from last week.

A) Do some examples of finding fundamental matrices  $e^{At}$ . Remind them that

$$\underline{x} = e^{At} \underline{x}_0$$

solves  $\underline{x}' = A\underline{x}$ ,  $\underline{x}(0) = \underline{x}_0$ .

a)  $A = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix}$

b)  $A = \begin{bmatrix} -3 & -2 \\ -2 & -6 \end{bmatrix}$ .

c)  $A = \begin{bmatrix} 0 & -3 \\ -2 & -3 \end{bmatrix}$

B) Solve  $\underline{x}' = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix} \underline{x} + \begin{bmatrix} 1 \\ e^t \end{bmatrix}$   
using the method of undetermined coefficients, i.e. "try"

$$\underline{x}_p(t) = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} + \begin{bmatrix} b_1 \\ b_2 \end{bmatrix} e^t.$$

Note, you'll have  $e^{At}$  from B) part a).

C) Repeat B) but use variation of parameters.