

1. Find the general solution to the following system of ODEs:

$$X' = \begin{pmatrix} -4 & -2 \\ 2 & -8 \end{pmatrix} X$$

Write the solution in terms of the fundamental matrix.

2. Use variation of parameters to find the general solution to

$$X' = \begin{pmatrix} -4 & -2 \\ 2 & -8 \end{pmatrix} X + \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

QUESTION: Can you use DIagonalization to solve the inhomogeneous problem?

3. Find the general solution to the following system of FORCED ODEs:

$$X' = \begin{pmatrix} 4 & \frac{1}{3} \\ 9 & 6 \end{pmatrix} X + \begin{pmatrix} -3 \\ 10 \end{pmatrix} e^t$$

4. Find the general solution to the following system of FORCED ODEs:

$$X' = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 4 & 3 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ -1 & 2 & 9 & 1 \end{pmatrix} X + \begin{pmatrix} 0 \\ -2e^t \\ 0 \\ e^t \end{pmatrix}$$

- (a) Do this using variation of parameters.
(b) Do this using diagonalization.

5. Find the general solution to the following system of FORCED ODEs:

$$X' = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} X + \begin{pmatrix} 5 \sin(t) \\ 0 \end{pmatrix}$$

- (a) Do this using variation of parameters.
(b) Do this using diagonalization.