Spring 2021 Math 20D Lecture B Homework #9
Due Sunday, 11:59pm, June 7th

Submit this homework through Gradescope.
Topics covered: section 9.4, 9.5, 9.6

1. Consider $y''' - 2y'' + y = \sin(t)$, rewrite the given scalar equation as a first-order system. Express the system in the matrix form $\mathbf{x}' = A\mathbf{x} + \mathbf{g}$.

2. Solve the initial value problem.

$$\mathbf{x}' = \begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$

3. Solve the initial value problem.

$$\mathbf{x}' = \begin{pmatrix} 6 & -3 \\ 2 & 1 \end{pmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} -10 \\ -6 \end{pmatrix}$$

4. Find the general solution of the differential equation:

$$\mathbf{x}' = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix} \mathbf{x} + \begin{pmatrix} e^{2t} \\ 1 \end{pmatrix}$$