Introduction to Differential Equations
Assignment # 12

Date Given: June 27, 2022
Date Due: July 4, 2022

P1. (2 points)

(a) Find the general solution of the system of equations

$$\boldsymbol{x}' = \begin{bmatrix} 3 & -2 \\ 2 & -2 \end{bmatrix} \boldsymbol{x}$$

(b) Draw a direction field, sketch a few of the trajectories, and describe the behavior of the solutions as $\to \infty$.

P2. (2 points)

(a) Find the general solution of the system of equations

$$\boldsymbol{x}' = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix} \boldsymbol{x}$$

(b) Draw a direction field, sketch a few of the trajectories, and describe the behavior of the solutions as $\to \infty$.

P3. (2 points)

(a) Find the general solution of the system of equations

$$\boldsymbol{x}' = \begin{bmatrix} 4 & -3 \\ 8 & -6 \end{bmatrix} \boldsymbol{x}$$

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(b) Draw a direction field and plot a few trajectories of the system.

P4. (2 points) Find the general solution of the system of equations

$$\boldsymbol{x}' = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix} \boldsymbol{x}$$

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P5. (2 points) Solve the initial value problem

$$\boldsymbol{x}' = \begin{bmatrix} 1/2 & 0 \\ 1 & -1/2 \end{bmatrix} \boldsymbol{x}, \qquad \boldsymbol{x}(0) = \begin{bmatrix} 3 \\ 5 \end{bmatrix}.$$