4512 Homework 3

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November 15, 2021

Section 3.8 Problem 12

Solve the initial-value problem $\dot{\boldsymbol{x}} = \begin{pmatrix} 3 & 1 & -2 \\ -1 & 2 & 1 \\ 4 & 1 & -3 \end{pmatrix} \boldsymbol{x}, \quad \boldsymbol{x}(0) = \begin{pmatrix} 1 \\ 4 \\ -7 \end{pmatrix}$

Section 3.9 Problem 3

Find the general solution to $\dot{\boldsymbol{x}} = \begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & -2 \\ 2 & 2 & 1 \end{pmatrix} \boldsymbol{x}$

Section 3.10 Problem 3

Find the general solution to $\dot{\boldsymbol{x}} = \begin{pmatrix} -1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -2 \end{pmatrix} \boldsymbol{x}$

Section 3.11 Problem 7

Find A if $\quad e^{At} = \begin{bmatrix} 2e^{2t} - e^t & e^{2t} - e^t & e^t - e^{2t} \\ e^{2t} - e^t & 2e^{2t} - e^t & e^t - e^{2t} \\ 3e^{2t} - 3e^t & 3e^{2t} - 3e^t & 3e^t - 2e^{3t} \end{bmatrix}$

Section 3.12 Problem 4

Solve the initial-value problem $\dot{\boldsymbol{x}} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \boldsymbol{x} + \begin{pmatrix} f_1(t) \\ f_2(t) \end{pmatrix}, \quad \boldsymbol{x}(0) = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

using variation of parameters.