

MATH 2120, Homework 6

1. Compute e^{At} where A is one of the following matrices.

(a) $A = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$

(b) $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$

(c) $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$

(d) $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 2 \\ 0 & -2 & 1 \end{pmatrix}$

2. (a) Find the general solution to $\vec{x}' = A\vec{x} + \vec{f}(t)$, where $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$ and $\vec{f}(t) = \begin{pmatrix} e^{2t} \\ 0 \end{pmatrix}$.

(b) Solve the system in (a) subject to initial condition $x(0) = 0$.

(c) Same as (b), except $x(0) = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$.