Math 2552 - Differential Equations
Georgia Institute of Technology, Spring 2019

Worksheet 7 (Jan 30, 3.3,6.3)
Systems, Distinct real eigenvalues

For each of the following systems, find the general solution, draw a phase portrait, and classify the fixed point. If an initial value is given, also solve the initial value problem.

1. $\mathrm{x}^{\prime}=\left(\begin{array}{cc}1 & 1 \\ 4 & -2\end{array}\right) \mathbf{x}$
2. $\mathbf{x}^{\prime}=\left(\begin{array}{ll}-2 & 1 \\ -5 & 4\end{array}\right) \mathbf{x}, \quad \mathbf{x}(0)=\binom{1}{3}$
3. $x^{\prime}=\left(\begin{array}{cc}3 & 6 \\ -1 & -2\end{array}\right) \mathbf{x}$
4. $\mathrm{x}^{\prime}=\left(\begin{array}{ccc}-1 & 0 & 3 \\ 0 & -2 & 0 \\ 3 & 0 & -1\end{array}\right) \mathbf{x}, \quad \mathrm{x}=\left(\begin{array}{c}2 \\ -1 \\ 2\end{array}\right)$
(note: On number 4, only solve. The phase portrait is in 3 dimensions and difficult to draw.)
