2-D & n-D Linear Systems (repeated and complex eigenvalues) (3.5, 6.4)

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

1. \( x' = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix} x \)

2. \( x' = \begin{pmatrix} 1 & -4 \\ 4 & -7 \end{pmatrix} x, \quad x(0) = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \)
3. \( x' = \begin{pmatrix} -7 & 6 & -6 \\ -9 & 5 & -9 \\ 0 & -1 & -1 \end{pmatrix} x \)

4. (optional) \( x' = \begin{pmatrix} 1 & -1 & 4 \\ 3 & 2 & -1 \\ 2 & 1 & -1 \end{pmatrix} x \)