Homework #9 **Math 527, UNH spring 2018**
Due Thursday, April 26 in recitation.

Problems 1-6. Find the general solution of the system of equations. For problems with complex eigenvalues, express your answer in both complex and real-valued form. Prime notation means differentiation in t, i.e. $x' = dx/dt$.

1. $x' = x + 2y$
$y' = 4x + 3y$

2. $\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -4 & 2 \\ -5/2 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

3. $x' = x + y$
$y' = -2x - y$

4. $x' = 5x + y$
$y' = -2x + 3y$

5. $\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -1 & 3 \\ -3 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

6. $x' = 12x - 9y$
$y' = 4x$

Problem 7. Solve the initial value problem.

$x' = -3x - y, \quad x(0) = 3$
$y' = 9x - 3y, \quad y(0) = 5.$

Most problems adapted from Section 8.2 of Zill's "First Course in Differential Equations," 9th edition.