1. Problem #7 (page 201). Check your answers with MATLAB and pplane, and attach at least two plots obtained with pplane.

2. Problem #8 (a,b) (page 202).

3. Consider the following love affair situation:

   Romeo: \( x' = -6x + 3y \), Juliet: \( y' = -4x + y \).

   Sketch the phase-plane portrait and describe the long-term behavior of this relationship. Any conclusions?

4. Consider the compartmental model described on pages 149–151.
   (a) Verify and explain equations (85a,b) and (86a,b).
   (b) Assume a bolus injection (all at time \( t = 0 \)) with \( m_1(0) = 2 \), \( m_2(0) = 0 \), \( u_1 = u_2 = 0 \). Suppose that the solution of the linear system \( (86a,b) \) is given by

   \[
   \begin{pmatrix}
   x_1(t) \\
   x_2(t)
   \end{pmatrix}
   =
   \begin{pmatrix}
   10e^{-2t} + 5e^{-t} \\
   -4e^{-2t} + 4e^{-t}
   \end{pmatrix}.
   \]

   Find the volume \( V_1 \) and then, assuming \( V_2 = 10 \) find the parameters \( L_{12}, L_{21}, D_1, D_2 \).