

## MATH 213 - Homework #6 (Due 03/03)

1. Problem #7 (page 201). Check your answers with MATLAB and `ppplane`, and attach at least two plots obtained with `ppplane`.
2. Problem #8 (a,b) (page 202).
3. Consider the following love affair situation:

$$\text{Romeo: } x' = -6x + 3y, \text{ Juliet: } y' = -4x + y.$$

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  $L_{12}, L_{21}, D_1, D_2$ .