2. Homework Assignment
Dynamical Systems III
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http://dynamics.mi.fu-berlin.de/lectures/
due date: Wednesday, 06.05.2015

Problem 1: Determine the stability of the origin of the following system for $\alpha \geq 0$:

$$\begin{aligned} \dot{x} &= \alpha x^2 - y^2, \\ \dot{y} &= -y + x^2 + xy. \end{aligned}$$

Hint: Consider the flow on the center manifold.

Problem 2: Consider the two linear systems

$$\begin{aligned} \dot{x}_1 &= -x_1, \\ \dot{x}_2 &= -x_2, \end{aligned}$$

and

$$\begin{aligned} \dot{y}_1 &= -y_1, \\ \dot{y}_2 &= -2y_2. \end{aligned}$$

Are they conjugated by a diffeomorphism of the form

(i) $(y_1, y_2) = (x_1, \phi(x_2))$?

(ii) $(y_1, y_2) = (\psi_1(x_1, x_2), \psi_2(x_1, x_2))$?