AMES 207
NONLINEAR CONTROL — Prof. M. Krstic

Homework 2

Due April 30, 1998

1. Without using a Lyapunov function $V(x, y)$, show that the system

$$\begin{aligned} \dot{x} &= -x^3 + y \\ \dot{y} &= -y + ax^3 \end{aligned}$$

   is g.a.s. for both $a = 1/2$ and $a = -1/2$. Hint: for $a = 1/2$ use the nonlinear small gain theorem, and for $a = -1/2$ use the passivity theorem.

2. Solve the above problem by constructing Lyapunov functions $V(x, y)$

3. Khalil, Exercise 10.22.

4. Khalil, Exercise 10.30.

5. Khalil, Exercise 10.32.