Nonlinear Phenomena: Homework 4

Reading: §6.1-6.3, 6.5-6.6, 6.8

Due May 16, 2013

Problem 1

Strogatz 6.1.2, 6.1.6

Problem 2

Strogatz 6.1.9*, 6.1.10*, and 6.1.13

Problem 3

Strogatz 6.3.13, 6.3.4, 6.3.9*

Problem 4

Strogatz 6.5.1, 6.5.2 (Hint: partial answers at back of book... As always, you must show all work.)
d) In addition to hand-sketching phase portraits, for each system, use a computer to draw homoclinic orbits clearly. Also, include a few closed orbits and (parts of) non-closed paths, using analytic expressions for "conserved energy" (rather than simulating a trajectory as a function of time, via Runge-Kutta or similar).

Problem 5

Strogatz 6.6.7, 6.6.4* (It's fine to "cheat" and do only the computer plots for 6.6.4. However, you must sketch some nullclines by hand for each case, to explain flow.)

Problem 6

Strogatz 6.8.2, 6.8.4, 6.8.7, 6.8.8

* For all starred (*) problems, include a print-out of your computer code.