Nonlinear Phenomena: Homework 2

Reading: §2.5-2.8, 3.0-3.2

Due April 23, 2013

Problem 1

Strogatz 2.5.5 (part b, only), 2.6.1

Problem 2

Strogatz 2.5.6

Problem 3

For the vector field defined by $\dot{x} = x^2 - 4x$, plot the potential field, $V(x)$, and identify all equilibrium points and their stability.

Problem 4

Strogatz 2.8.2, part d only.
Example MATLAB code to draw local gradients is at the end of this assignment.

Problem 5

Strogatz 2.8.3, 2.8.4, 2.8.5

Problem 6

Strogatz 3.1.1, 3.2.1

```
function hw2_drawvec
% MATLAB file hw2_drawvec.m, for Homework 2
% Katie Byl, April 8, 2013. UCSB. ECE 183 / ME 169 / PHYS 106
figure(1); clf
u = [-.05 .05];
for t = 0:.25:10
    for x = pi*[-1:.05:1]
        dx = fn(x);
        plot(t+u,x+dx*u,'k'); hold on; grid on
    end
end
end

function dx = fn(x)
% Below is where you define x'=F(x)
dx = sin(x);
end
```