Homework # 7
Due Nov. 7 at the beginning of the exam time.

5.2

A Compute the Lyapunov exponents of the baker map

$$B(x,y) = \begin{cases} (x/2, 2y \pmod 1) & \text{for y} \geq 1/2 \\ ((x+1)/2, 2y \pmod 1) & \text{for y} < 1/2 \end{cases}$$

acting on the unit square. What does the sum of the Lyapunov exponents tell you about what this map does to areas?

T7.2 (ODE review)

7.2 (ODE review)

T7.9 (ODE review)

T7.5 This should be quick. Sketch the phase plane also.

7.3

7.10 (x_2 for b is supposed to be a critical point of the cubic type.)

T7.11 Use $P(x)$ for the undriven Duffing oscillator. Please also carefully sketch level curves of E for the case $c = 0$, and phase plane flow curves for $c => 0$. This will help you.

Comp. Exp. 7.3 Forced damped Duffing oscillator. Answer the question in the book for this experiment. You might want to use Matlab's ode45 for the formulation as two coupled first-order ODEs. See the end of intro46.m for an example.

Go out to at least 200 time units. Please produce a phase plane plot of the three different orbits and state an initial condition which leads to each of the following: (i) two period-6π orbits, (ii) one period-2π orbit. Remember to clean up your orbits by not plotting an appropriate amount of early "settling" times. [Hint: to measure periods you will need to plot graphs vs. t but you do *not* have to hand these in.]