

**Physics 3221**  
**Intermediate Mechanics**  
**Problem Set 7**  
Due: Friday, March 4, 2005

**7.1** Consider the damped driven pendulum with equation of motion

$$\ddot{x} + b\dot{x} + \sin x = a \cos ct.$$

Using the java applet available on the **Chaos on the Web** web page, investigate this system for the case that the parameters  $a = 0.7$  and  $b = 0.05$  are fixed. Determine which values of  $c$  (0.1, 0.2, 0.3, ..., 1.5) produce chaotic motion. For each value of  $c$ , be sure to wait long enough for the transients to die down— what looks like chaos may not be! Sketch the phase plot you find for the steady state motion when  $c = 0.3$ . (If you have time, explore the Poincaré sections for the  $c$  values which give chaotic motion. They're very nice!)

**7.2** Problem 4-12, Marion & Thornton, Pg. 180.

**7.3** Problem 4-16, Marion & Thornton, Pg. 180.

**7.4** Problem 4-19, Marion & Thornton, Pg. 180.