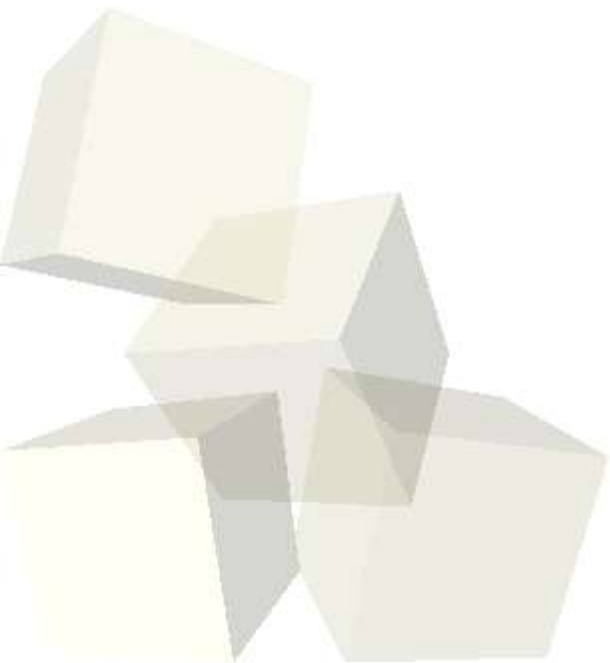10-7-2005
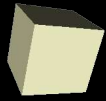
- What did we talk about last class?
- I wrote code to draw a bifurcation diagram. Let's take a look at that and see the nature of bifurcations.
- Let's finish some stuff with Monte Carlo methods before we do today's topic.

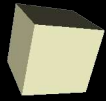- To see how these work we can play with some simple toy problems.
- Work out the percentage chances of getting different numbers when you roll a certain number if dice.
- Estimate π by "throwing darts" at the unit square in the first quadrant.
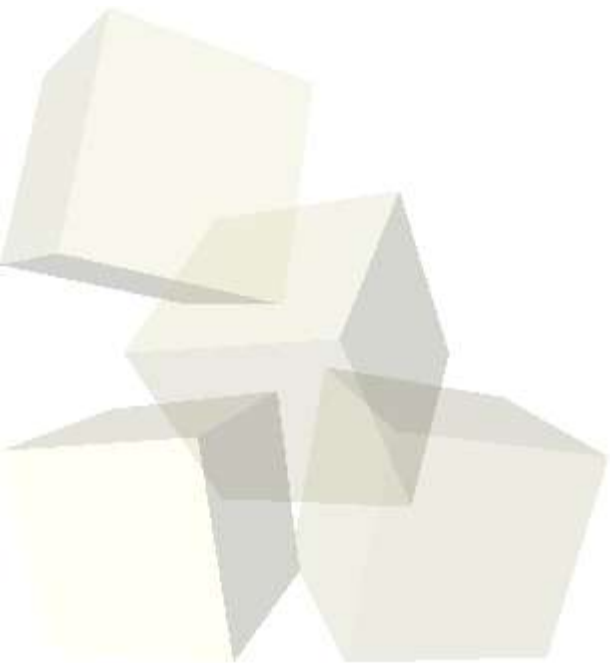
- Some systems are too complex to treat deterministically, or they truly have a probabilistic nature to them.
- Light scattering in a medium like a cloud. Photons can be considered independently and we pull random numbers to determine how far they go between scattering events and when they scatter a random number tells us what direction they go in.
- In cells these types of methods can be used to model the gating of ion-channels as a stochastic process.
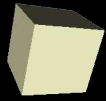
- Another method is can be very useful for simulating probabilistic systems is that of the Markov chain.
- In this method you have a number of states and each state has a certain population associated with it. There is a transition matrix that tells you how much stuff moves from one state to another in a certain time period.
- Repeated multiplication by the matrix tracks the evolution of the system.
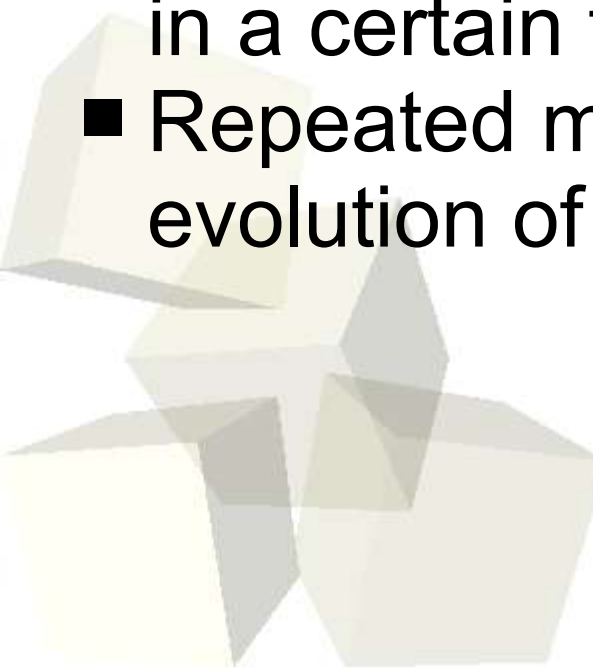
- Many types of systems that we want to simulate are actually made of multiple different bodies that interact in various ways.
- The simplest of these to deal with in Matlab have forces between the particles so that we can solve the motion of the bodies using a system of ODEs. Gravity is a simple example of this.
- Let's go through and code up a multibody gravitational system to see what it looks like in Matlab.
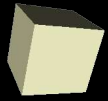
- Your midterm is next Wednesday. I made the project due the Wednesday after you get back from fall break.