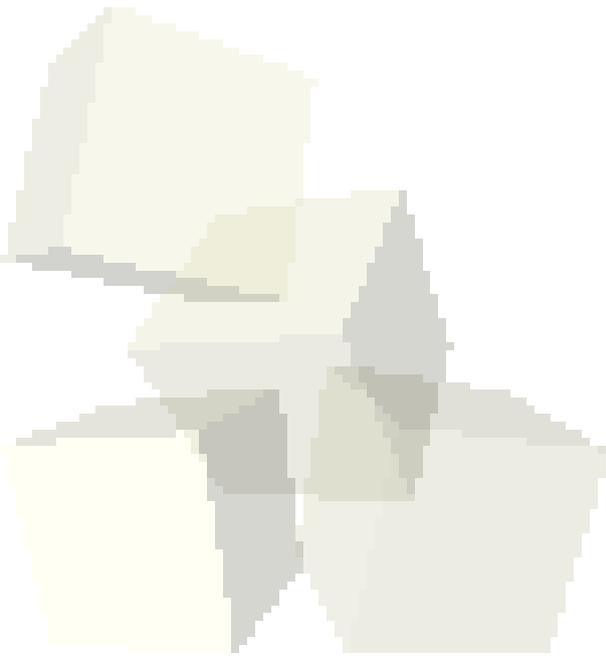




# Systems of Eqs and Vector Math

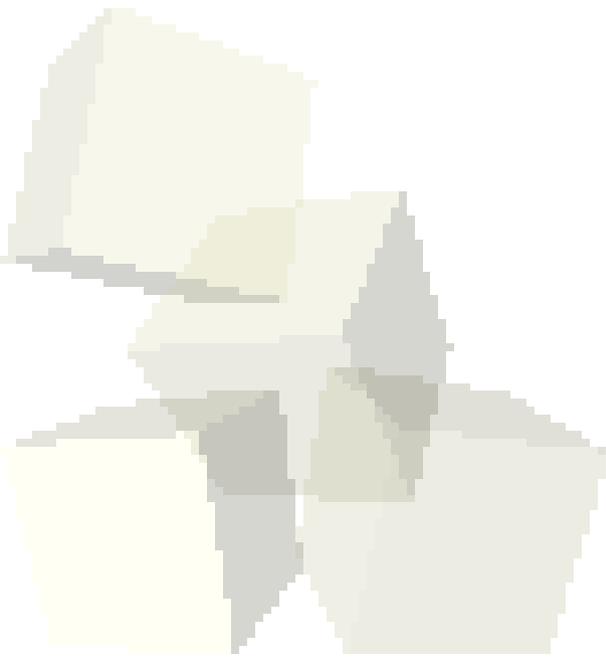
2-8-2008





# Opening Discussion

- What did we talk about last class?
- Do you have any questions about the reading?
- Do you have any questions about the assignment?





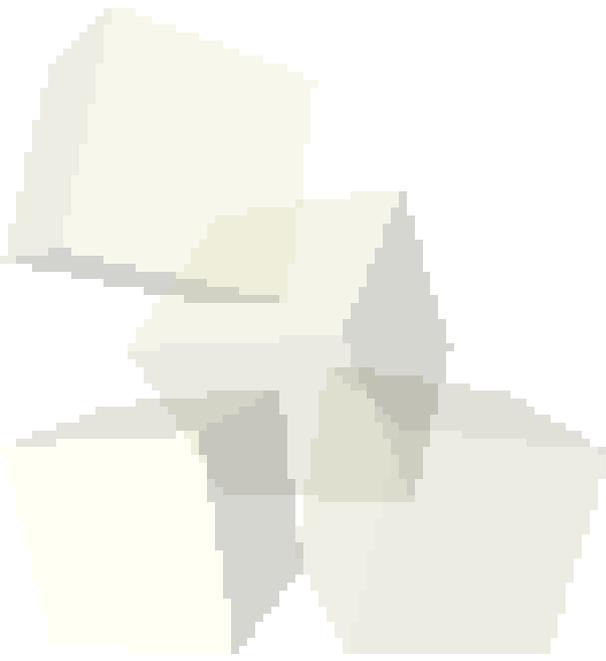
# Fitting Data as a Linear Eq

- The process of fitting data points to a linear combination of functions can be viewed as solving a system of linear equations.
- Given points  $(x_1, y_1) \dots (x_n, y_n)$  and functions  $f_1(x) \dots f_n(x)$  we fill in the  $A$  matrix with  $A_{ij} = f_j(x_i)$  and let the  $y$  values be the  $y$  vector. Solving gives us the proper coefficients.
- If it is overdetermined this process will give us the values from a least-squares fit.



# Non-Linear Equations

- What if you want to do something like perform an exponential fit?
- In general we'd have to do a different procedure with non-linear optimization.
- If the fitting function isn't too complex though you can sometimes convert it to a linear form using a bit of algebra.





- With the time remaining lets talk about some concepts of N-body simulations and how they would appear in Matlab.
- N-body simulations involve a number of discrete particles. These particles feel various forces.
- The locations, velocities, and forces are all represented as vectors. In Matlab these can be just arrays and the language simplifies how we express the math.





# Closing Remarks

- Quiz #2 is next class.

