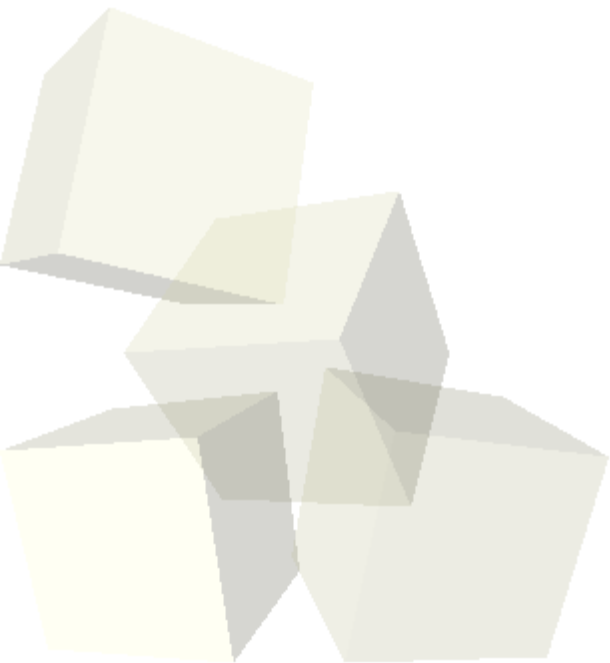




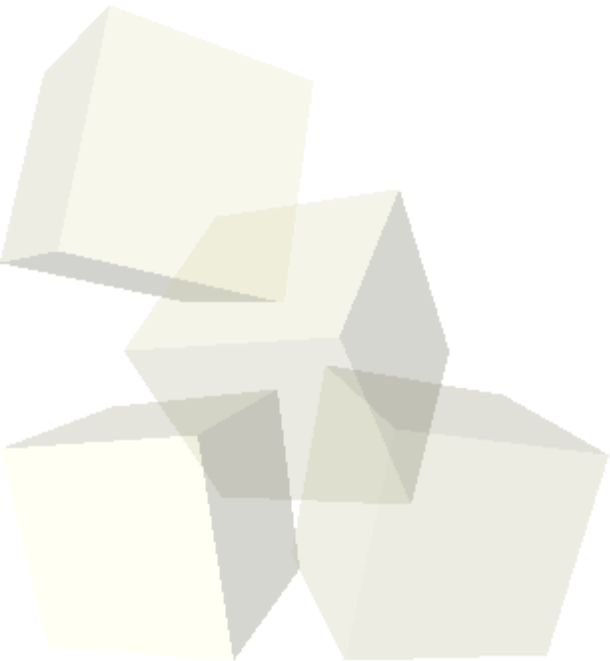
11-21-2005





Opening Discussion

- What did we talk about last class?
- Since I'm going to be talking to Dr. Livingstone about BLAST tomorrow I figure we should hold off on doing that topic until then. Instead, we are going to do a fun overlap between Biology and CS today.





References in Perl

- Since living without references is such a pain, lets talk really quickly about how to use references in Perl.
- A reference is a scalar value that can refer to a scalar, a list, or a hash. You get a reference to a variable by prefixing it with \.
- Inside of a function you treat the reference like a scalar, but when you what to pull out what it refers to you put an extra special symbol in front. You use \$\$ to dereference a scalar reference, @\$ to dereference a list and %\$ for a hash.

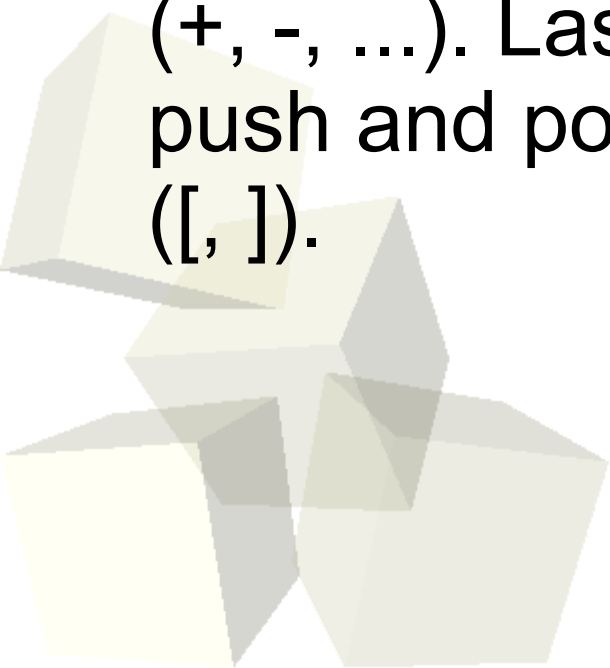


- L-Systems were developed by Lindenmayer to model the growth of various biological systems.
- They are grammars much like what we discussed before for Chomsky grammars. However, in an L-system, all the characters have productions applied to them in parallel. Some characters can become themselves.
- There are numerous types of L-systems. They can be context free or context sensitive. They can be deterministic or stochastic. For more power they can be parameterized or extended.



Graphical Interpretation

- Most applications of L-systems involve converting the strings over to some type of graphical representation. This is typically done with turtle graphics.
- There are two characters for move forward and draw a line forward (F, f). There are also various characters for rotating either in 2-D or 3-D space (+, -, ...). Lastly, they typically have some type of push and pop characters for the positions of things ([,]).



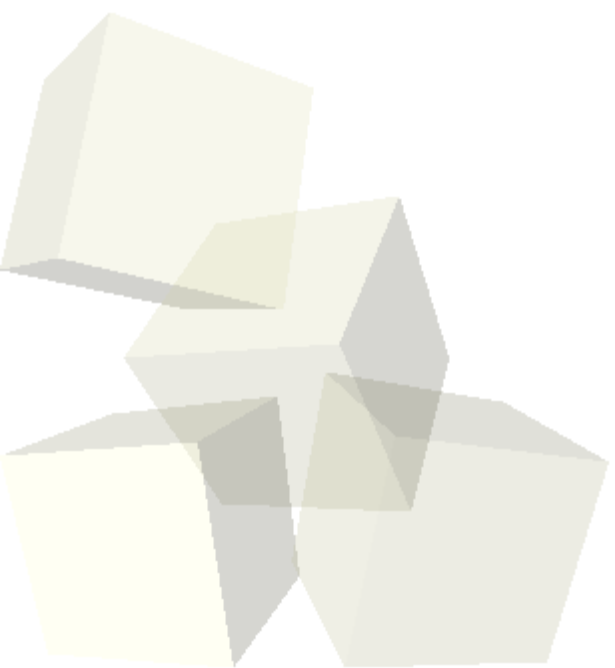


- This figure shows some simple grasses generated with L-systems.





- Let's go look at some L-systems stuff now and write some code in Perl to do L-systems as strings. We don't have any ability to draw in Perl so we can't render those strings unless we write to file and then read it back in in a different language.





Reminders

- Remember that assignment #9 is due today.

