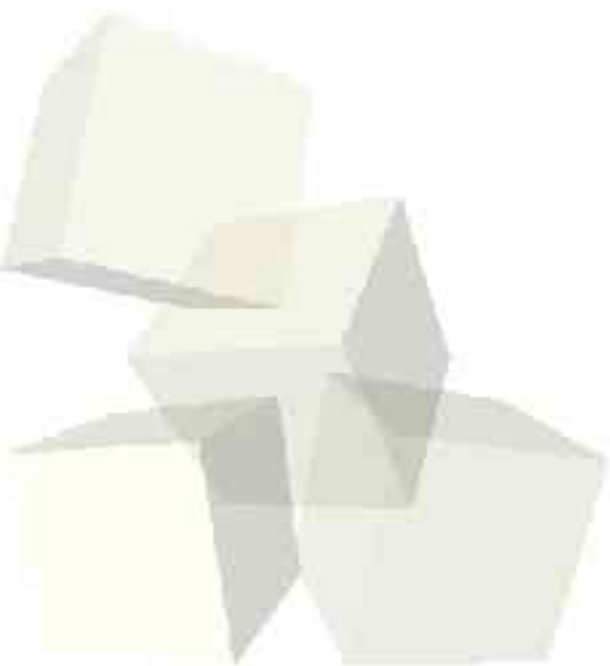




Set and Relations 2

10-4-2004





Opening Discussion

- What is a set? How are we going to represent them in our code? What are some basic operations on sets that you know of?
- The midterm is on Friday. It can cover anything we have covered so far and will include 10 questions similar to the quiz questions.
- Do you have any questions about the assignment?



Building Logic Operations

- We can play with sets in Scheme in a way very similar to what we do in abstract math. We do this by extending `neither`, `both`, and `at-least-one` to work on sets.
- These become the operations, `none`, `for-all`, and `there-exists`. It turns out that if we write `none`, the others can be easily built with `compose`.





Operations on Sets

- There are many operations that we could write dealing with sets. We want to try to build up a few today in class.
 - ♦ Set-equal? - test equality of sets.
 - ♦ Element – tests if an element is in a set
 - ♦ Contains – same as element, but opposite order of arguments
 - ♦ Superset and Subset
 - ♦ Cardinal – number of elements in the set
 - ♦ Intersection, union, and difference



Ordered-Pairs and Cartesian Product

- An ordered-pair is simply two values where the order of the two is taken into account. These are very useful in discrete mathematics.
- The Cartesian product of two sets is defined as the set of all ordered pairs containing a first element from the first set and a second element from the second set.
- Let's look at code that produces the Cartesian product of two sets.



Relations

- A relation is a mapping from one set to another and can be any subset of the Cartesian product of the sets.
- It is more common to use functions which are relations where there are no two pairs that have the first element but different second elements.
- You can look in the book for further discussion of these topics and code if you want to play with it.



Minute Essay

- The really interesting stuff in this discussion was in the way that it combines and uses higher order functions so seamlessly. At least for me, just reading this code took significant thought because I'm not used to thinking that way. What do you think are the trade-offs of this ability? Do you feel they are worth it?

