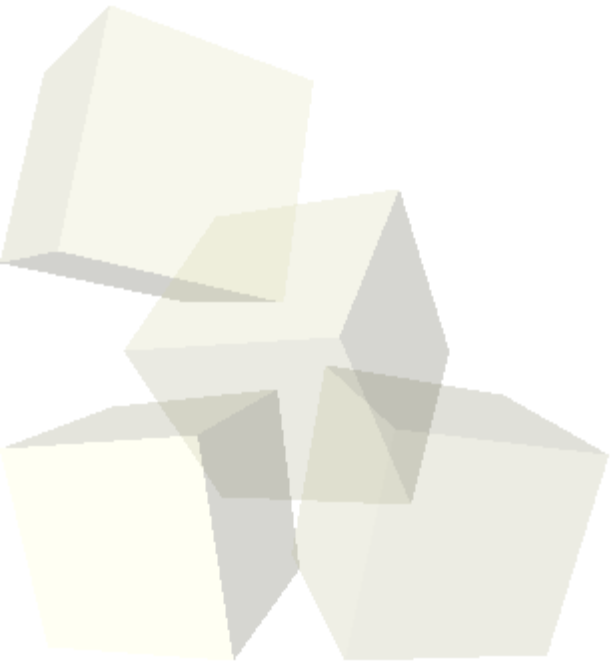




# List Based Stacks and Queues

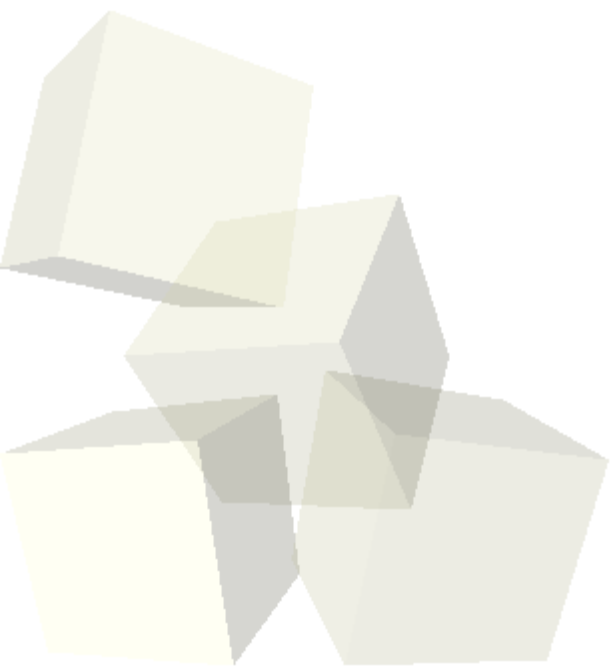
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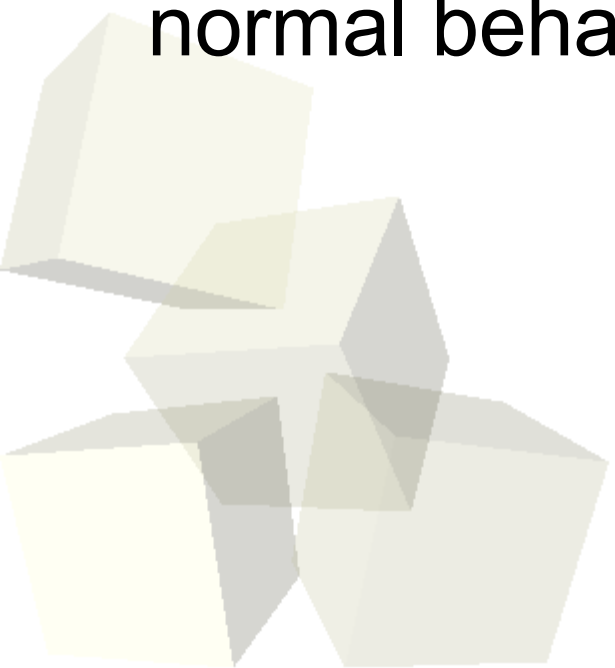
# Opening Discussion

- Minute essay response.
- How do you implement a stack with a linked list?
- How do you implement a queue with a linked list?





- I want you all to write a ListStack and a ListQueue. These should implement MyStack and MyQueue, but instead of using arrays (like ArrayStack and ArrayQueue), they should have a linked list inside of them.
- Remember that it is essential that the implementation be  $O(1)$  for all operations on normal behavior.





# Priority Queue ADT

- A priority queue has the same methods as a normal queue, only the contents are ordered not only by arrival time, but also by a priority. So dequeue gets the highest priority object and if several have that priority, it gets the one that has been there the longest.
- One way to implement a priority queue is with a sorted linked list. To make this flexible, you could have it take a comparator that tells you the ordering. That would be provided when the priority queue is constructed.
- What order are the various operations for this implementation of a priority queue?



- You can do lots of things with the standard GUI elements in Swing. We've been able to set up quite a bit of a GUI using that. However, no GUI can predict everything that you will want to do and we want to be able to add custom drawing to our application.
- For this we will rely on the Java2D library. Java2D was added about the same time Swing was and it is fundamentally based on the Graphics2D class. There is also a Graphics class that provides more basic custom graphics capabilities. Graphics2D inherits from Graphics so it can do all the same things and more.

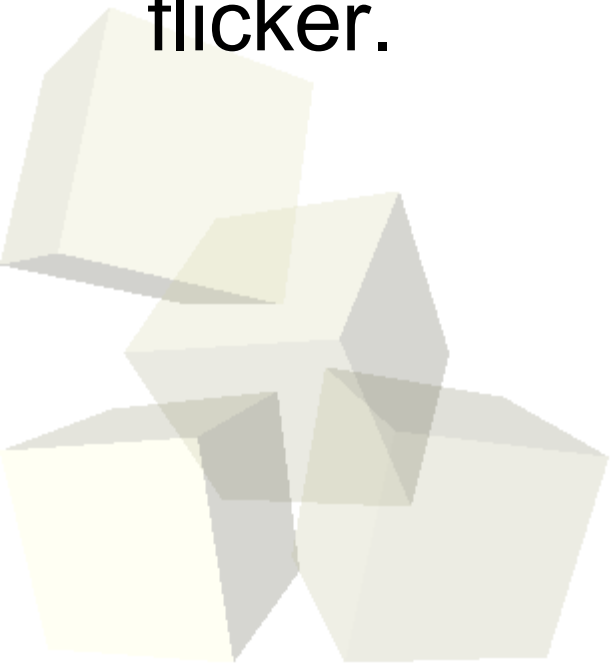
# Making Custom Drawn Components

- There are three steps to making a component class that we can do custom drawing to.
  - ◆ Make a new class and have it inherit from JComponent or a subtype of it.
  - ◆ Override the paintComponent method in your class.
  - ◆ Draw with the Graphics object that was passed into the paintComponent method.
- Let's look a bit at the Graphics2D class to see what some of the possibilities might be for what we can draw.
- Now we can do these steps in our program to make a central panel we can draw to.



# More General Drawing

- Of course, Graphics2D objects aren't limited to just drawing on components.
- The Image class (and its subtype BufferedImage) will let you get Graphics objects that you can draw to and what you draw will be on the image.
- We'll typically do this even if we are drawing to a component to implement buffering which reduces flicker.





- What do you see as the relative advantages and disadvantages of the array and list based implementations of stacks and queues?
- The midterm is next class. The office hours on Monday will be used for a review session if you show up with questions for me to answer.

