CS 367 - Introduction to Data Structures
Tuesday, June 16, 2015 - Lecture 2

Course website: http://pages.cs.wisc.edu/~cstapleton/367/
Piazza: https://piazza.com/wisc/summer2015/cs367/

Last Time

- Course Introduction & Logistics -- see Syllabus
- Sign up for Piazza!
- Characteristics of Good & Reusable Software
- Collections
- Generics & Abstraction
- Interfaces
- Abstract Data Types
- Sack ADT: Examples & Implementation
- HW0 Assigned

Today

- Review SackADT
- Generics & the ListADT
- ListADT Concept & Design
- ListADT Use
- ListADT Implementation
- Complete HW0 by tomorrow!
- HW1 Assigned
- Read: Exceptions

Next Time

- HW1 due 11 PM on Monday, June 22 2015.
The Sack ADT and Java objects

```java
import java.util.*;

public interface SackADT {
    void add(Object item);
    Object remove() throws NoSuchElementException;
    boolean isEmpty();
}
```

Why were we using the Object class in our SackADT interface?

Generics - a Better Way to Make a General Sack ADT

What are they?

Disadvantages and Advantages of SackADT?

What is our SackADT missing?

In what instances would we want to use a SackADT?
Design - List ADT

Concept

Operations

Issues
SackADT vs. ListADT -- What's an improvement?

What do we lose?

Error-handling issues
Using the List ADT: Example 1

What does this code fragment do? Suppose L is a list.

```java
for (int i = 0; i < L.size(); i++) {
    L.remove(i);
}
```

Implementing List ADT: Examples

Complete the method below so that it returns true iff the given item is in the list.

```java
public boolean contains(E item) {
    ...
}
```

What problem might occur with the following implementation:

```java
public void add(E item) {
    items[numItems] = item;
    numItems++;
}
```
Using the List ADT: Example 2

Assume L is a List. Write a code fragment to reverse L without using an additional List or any other data structure (not even an array).

Lists in Java:

Interface: http://docs.oracle.com/javase/7/docs/api/java/util/List.html

Implementation using arrays (ArrayList):
http://docs.oracle.com/javase/7/docs/api/java/util/ArrayList.html

HW1 Assigned