6.001 recitation 3/16/07

- tags
- stacks and queues

Dr. Kimberle Koile
What are tags?
How are they useful?
What is an example of a tagged data structure?
stacks and queues
stacks

- **constructor:**
  (make-stack)

- **selectors:**
  (top stack)
  (stack-elements stack)

- **operations:**
  (stack? stack)
  (empty-stack? stack)
  (insert-stack-elt stack elt)
  (delete-stack-elt stack)
stacks

(define (tagged-list? tag l) (and (pair? l) (eq? tag (car l))))
(define *stack-tag* 'stack)

- **constructor:**
  (define (make-stack)

- **selectors:**
  (define (top stack)

- **operations:**
  (define (stack? stack)

  (define (empty-stack? stack)
1. Fill in the code for `insert-stack-elt` (aka push) for a stack.

```
(define (insert-stack-elt element stack)
  (if (stack? stack)
      (cons
       (cons
        (cons
         (error "Insert on a non-stack")))
      stack))
```
2. Write delete-stack-elt (aka pop) for a stack. This version of pop should return a new stack that contains all elements except the top. (Don't forget the two error checks.)

(define delete-stack-elt (stack) )
queues

(define (tagged-list? tag l) (and (pair? l) (eq? tag (car l))))

(define *queue-tag* 'queue)

• **constructor:**
  (make-queue)

• **selectors:**
  (front-queue queue)

  (queue-elements queue)

• **operations:**
  (queue? queue)

  (empty-queue? queue)

  (insert-queue-elt queue elt)

  (delete-queue-elt queue)
3. Write `insert-queue-elt` for a `queue`. (Don't forget an error check.)

   (define insert-queue-elt (queue) ...)
queue problems

4. Write delete-queue-elt for a queue. (Don't forget an error check.)

   (define delete-queue-elt (queue) )
stacks and queues

- **constructor:**
  - (make-it)

- **selectors:**
  - (first-elt s-or-q)
  - (elements s-or-q)

- **operations:**
  - (is-type? s-or-q)
  - (empty? s-or-q)
  - (insert-element s-or-q elt)
  - (delete-element s-or-q)
5. Write a `delete-elt` procedure that works on either stacks or queues.

```scheme
(define delete-elt s-or-q)
```
What if we could change the data structures rather than copying them?