

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science
6.001—Structure and Interpretation of Computer Programs
Spring 2006

Recitation 6
Data Structures and Abstractions

Scheme

New procedures

1. `(cons a b)` - Makes a cons-cell (pair) from a and b
2. `(car c)` - extracts the value of the first part of the pair
3. `(cdr c)` - extracts the value of the second part of the pair
4. `(cdadadada r c)` - shortcuts. `(cadr x)` is the same as `(car (cdr x))`
5. `(list a b c ...)` - builds a list of the arguments to the procedure
6. `(adjoin a lst)?` - doesn't exist (use `(cons a lst)`)
7. `(list-ref lst n)` - returns the *n*th element of `lst`
8. `(append l1 l2)` - makes a new list containing the elements of both lists

Problems

1. Draw box-and-pointer diagrams for the values of the following expressions. Also give the printed representation.
 - (a) `(cons 1 2)`
 - (b) `(cons 1 (cons 3 (cons 5 '())))`
 - (c) `(cons (cons (cons 3 2) (cons 1 0)) '())`
 - (d) `(cons 0 (list 1 2))`

(e) `(list (cons 1 2) (list 4 5) 3)`

2. Write expressions whose values will print out like the following.

(a) `(1 2 3)`

(b) `(1 2 . 3)`

(c) `((1 2) (3 4) (5 6))`

3. Write expressions using `car` and `cdr` that will return 4 when the `lst` is bound to the following values:

(a) `(7 6 5 4 3 2 1)`

(b) `((7) (6 5 4) (3 2) 1)`

(c) `(7 (6 (5 (4 (3 (2 (1)))))))`

(d) `(7 ((6 5 ((4)) 3) 2) 1)`

4. Define a predicate `list?` that takes any value and returns `#t` if it is a list and `#f` otherwise.

Abstraction

Suppose you're working for the registrar, and she asks you to develop a scheme system to keep track of each student's registration...

Structures?

Procedures?

Feedback

Name: **Anonymous!**

Year: Section: Favorite Color:

Programming Experience:

1. In general, how is recitation:

Great! Good OK Poor I don't attend

2. Recitation pace compared to your optimal pace?

Too Fast Fast OK Slow Zzzzzz

3. Problem solving balance?

More individual problem solving OK Need More pontificating

4. Pass-the-{Hedgehog/Heatsink}?

Never! Use it More!

5. Has Jacob completely lost his marbles?

Lose more marbles Keep what he's got Find some quick

6. Can you read anything written on the board?

Just fine Too Messy Incomprehensible

7. Name something you dislike about recitation:

8. Name something you like about recitation:

9. Any other comments / suggestions for improvement:

10. How much did project 1 suck? Be descriptive. Haiku accepted.