Passing Functions

Example 1: consall

We could have different functions `sums`, `lengths`, and `cdrs`. Each one does a certain thing to every element of a list.

The code is very repetitive. And if we want to do something else to every element of a list, we need to write yet another function.

Instead, we can write one general function.

```
(defun consall (lists fcn)
    (cond ( (null lists) nil )
          ( t (cons (funcall fcn (car lists))
                    (sums (cdr lists))
              )
          )
    )
)
```


Sample run

```
gardiner.cs 1% cl
Allegro CL 4.3 [SPARC; R1] (5/10/96 17:51)
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USER(1): :ld fcnpars.cl
; Loading ./fcnpars.cl

USER(2): (sums `((3 1) (6 29 4) (5) ()))
(4 39 5 0)

USER(3): (lengths `((3 1) (6 29 4) (5) ()))
(2 3 1 0)

USER(4): (cdrs `((3 1) (6 29 4) (5) ()))
((1) (29 4) NIL NIL)

USER(7): (consall`((3 1) (6 29 4) (5) ()) `sumlist)
(4 39 5 0)

USER(8): (consall`((3 1) (6 29 4) (5) ()) `length)
(2 39 5 0)

USER(9): (consall`((3 1) (6 29 4) (5) ()) `cdr)
((1) 39 5 0)
```

Example 2: prune

```
; Return a new list containing only the elements of "list"
; that pass the test.
; Precondition:


(defun prune (list test)
    (cond ( (null list) nil )
          ( (funcall test (car list))
                 (cons (car list)
                       (prune (cdr list) test)
                 )
          )
          ( t (prune (cdr list) test) )
    )
)
```

Sample run

```
USER(12): (prune '((3 1) 4 (x y z) (x) y ()) 'atom)
(4 Y NIL)

USER(13): (prune '((50 62 55) (38 71 12 48) (99 91 95))
                 '(lambda (x) (> (avg x) 50))
          )
((50 62 55) (99 91 95))
```


Sample run of function bubblesort

```
gardiner.cs 1% cl
Allegro CL 4.3 [SPARC; R1] (5/10/96 17:51) ...


USER(1): :ld sort.cl
; Loading ./sort.cl


USER(2): (bubblesort '(3 4 1 5 0 2 3) '<)
(0 1 2 3 3 4 5)


USER(3): (bubblesort
              '((a b c) (a) (1 2 3 4) () (z z z) (y y))
               (lambda (x y) (< (length x) (length y)))
         )
(NIL (A) (Y Y) (Z Z Z) (A B C) (1 2 3 4))


USER(4): (trace helper bubbleFirstN)
(BUBBLEFIRSTN HELPER)
```