

CSCI-512– Winter 2010 – ASSIGNMENT 1

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This assignment is due on **Tuesday, February 01, 2010**. The assignment is worth 20 points.

Programming Problem 1. (15 pts, 5 each) (adopted from Paul Graham, ANSI Common Lisp, p. 57) Suppose that function `pos+` takes a list and returns a list of each element plus its position. For example:

```
> (pos+ '(7 5 1 4))
(7 6 3 7)

> (pos+ '(4 1 5 7))
(4 2 7 10)
```

Define this function in three ways using (a) recursion, (b) iteration, and (c) `mapcar`. Call your functions `rec-pos+`, `it-pos+`, and `map-cos+`, respectively.

Programming Problem 2. (5 pts) Write a function `puzz15` which generates a random state for the 15-puzzle (tiles 1..15 in 4x4 grid). Your puzzle state should be represented by a list of lists, for example

```
'((2 4 6 8) (1 3 5 7) (9 B 10 12) (15 14 13 11))
```

You may use Common Lisp function `random` where `(random n)` generates a random number between 0 and `n-1`. Your top-level function `puzz15` should start out like this

```
(defun puzz15 ()
  (let (puzz)
    ; code to generate 15 puzzle state ...

    puzz))
```

Your puzzle state should be printable with the following function

... see next page

```
(defun show-puzz15 (puzz)
  (dolist (row puzz)
    (dolist (fld row)
      (if (or (and (numberp fld)
                    (< fld 10))
              (eql fld 'B))
          (format t " ~A " fld)
          (format t "~A " fld))
      )
    (terpri)
  )
  (values))
```

Submit hardcopies—of your programs in the beginning of class on the due date. In the lab session on February 02, be prepared to **demonstrate** your four functions to the instructor. Your homework will not be considered complete without having given your demonstration.

Help, my program does not work! ... hand it in anyway, and receive **partial credit**.