THIRD QUIZ

You have 15 minutes from the start of class to complete this quiz. Read the problems with care; work with deliberate speed. Don’t give us more than we ask for. The usual instructions apply. Good luck!

You may show lists in any of three ways: (cons ‘AC (cons ‘DC empty)), (list ‘AC ‘DC), or ‘(AC DC).

Problem 1 (2 points)
Evaluate each of the following expressions. (That is, what does DrScheme display in the interactions window when you enter the expression or click Run?)

(define ELECTORS 538)
(define NEED-TO-WIN (+ 1 (/ ELECTORS 2))); 270 needed to win, 50% + 1
(a) (> = ELECTORS 535)

(b) (and (> = NEED-TO-WIN 270)
(< NEED-TO-WIN ELECTORS))

(c) (+ 10
test )
(cond
((= ELECTORS (+ 435 100 3)) 55)
(else 44 ))

Problem 2 (5 points)
Evaluate each of the following expressions. Use this definition independently for each of the five parts:
(define L (cons ‘AA (cons ‘BB (cons ‘CC (cons ‘DD empty))))))
(a) (first L)

(b) (rest L)

(c) (first (rest L))

(d) (cons ‘RN (rest (rest L)))

(e) (cond
((equal? (cons ‘OK empty) ‘OK) ‘orange)
((empty? (rest (rest (rest L))))) ‘grapefruit)
((equal? (first (list ‘OK)) ‘OK) ‘lime)
(else ‘lemon))
Problem 3 (11 points)

We define a book as a structure

    (define-struct book (author title year wholesale retail))

where author and title are strings and year, wholesale, and retail are numbers (representing the year the book was published, the book’s wholesale price, and its retail price).

(a) (3 points) Define the function book-profit-margin as described below.

    ;; book-profit-margin: book -> number
    ;; Return the difference between the retail price and the wholesale price of a book

    (define book-profit-margin
      (lambda (B)
        (- (book-retail B) (book-wholesale B))))

(b) (8 points) Define the function increase-profit as described below. Where applicable, use functions you have already defined rather than duplicating code.

    ;; increase-profit: book number -> book
    ;; If the input book’s profit margin is at least the specified number, return the input book unchanged. Otherwise, return the input book with its retail price increased by the input number.

    (define increase-profit
      (lambda ( B threshold )

        (cond
          ((>= (book-profit-margin B) threshold) B)

(check-expect (increase-profit (make-book “X” “Y” 2008 25.00 35.00) 10.00) (make-book “X” “Y” 2008 25.00 35.00))

(check-expect (increase-profit (make-book “X” “Y” 2008 25.00 35.00) 20.00) (make-book “X” “Y” 2008 25.00 55.00))

Problem 4 (2 points)

Look back at the top of Problem 1. In just a few English words, why did we define NEED-TO-WIN as we did, instead of just (define NEED-TO-WIN 270)?