CSE 341 — Scheme Discussion Questions

1. What do the following Scheme expressions evaluate to?
   (a) (* 2 (+ 4 5))
   (b) (= 3 (+ 1 3))
   (c) (car '(elmer fudd daffy duck))
   (d) (cdr '(elmer fudd daffy duck))
   (e) (and (= 1 2) (= 10 (/ 1 0)))

2. Define a Scheme function to find the average of two numbers.

3. Define a Scheme function `mymax` to find the maximum of two numbers.

4. Define a Scheme function `sign` to find the sign of a number (so -1 if the number is negative, 0 if it’s 0, 1 if it’s positive).

5. Suppose we evaluate the following Scheme expressions:

   (define x '(snail clam))
   (define y '(octopus squid scallop))

   Draw box-and-arrow diagrams of the result of evaluating the following expressions. What parts of the list are created fresh, and which are shared with the variables `x` and `y`?

   (a) (cons 'geoduck x))
   (b) (cons y y)
   (c) (append x y)
   (d) (cdr y)

6. What is the result of evaluating the following Scheme expressions?

   (a) (let ((x (+ 2 4))
            (y 100))
        (+ x y))
   (b) (let ((x 100)
            (y 5))
        (let ((x 1))
            (+ x y)))

7. Define a function `myleNGTH` to find the length of a list.

8. Define a recursive function `add1` that takes a list of numbers, and returns a new list of numbers, each being 1 plus the original. For example, `(add1 '(10 20 30))` should evaluate to `(11 21 31)`.

9. Define a non-recursive version of `add1` that uses `map` and `lambda.`