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`.