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. Find the squid! For each of the following variables, write an expression that picks out the symbol squid. For example, for this definition: (define x '(squid clam octopus)) the answer is (car x).
   (a) (define y '(clam squid octopus))
   (b) (define z '(clam starfish (squid octopus) mollusc))

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

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

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. Define a recursive function sum to find the sum of the numbers in a list.

7. Define a tail recursive version of sum. (Define an auxiliary function if needed.)

8. Define a recursive function myfilter like the built-in filter function in Scheme.

9. 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)))

10. Define a function mylength to find the length of a list.