CECS 342

Lab assignment 4

Due date: Monday, April 22

In this lab assignment, you can collaborate with other team members to do the lab assignment. When you submit the lab assignment, you only have to demonstrate your app with one team member.

20 points

1. [5 points] Write tail-recursive versions of the following:

```
;; compute integer log, base 2
;; (number of bits in binary representation)
;; works only for positive integers
(define log2
(lambda (n)
(if (= n 1) 0 (+ 1 (log2 (quotient (+ n 1) 2))))))
```

2. [5 points] Write purely functional Scheme functions to return a list containing all elements of a given list that satisfy a given predicate.

   For example, (filter (lambda (x) (< x 5)) '(3 9 5 8 2 4 7)) should return (3 2 4).

3. [5 points] Write purely functional Scheme functions to return all rotations of a given list. For example, (rotate '(a b c d e)) should return ((a b c d e) (b c d e a) (c d e a b) (d e a b c) (e a b c d)) (in some order).

4. [5 points] Write a Scheme function called reverse to reverse a list passing to the function as an argument. In this problem, you are allowed to use only cond, append, cdr, car, and cons.

   Use a display function to display the reverse list.
   (display(reverse '(A B B C D D E F G G))) should output the following:
   G G F E D D C B B A
   You can use your input.

Grading;
Each team member submits the following:

1. Submit a Scheme file for each problem to the Canvas. (Missing each file -5 points)
2. A pdf file with code and runtime output for each problem (Missing pdf file for each problem -5 points)

3. You only demonstrate your app with one team member. In the comment box, write the name of a team member who verifies lab 4 to you, and write down which problems are complete and correct.