Lisp Programming

Submit Assignment

Due Wednesday by 11:59pm **Points** 20 **Submitting** a file upload
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In this program, you will write and run LISP programs. The Computer Science department provides a LISP interpreter for scheme. The executable is called "mzscheme" You can use other LISP implementations and are not restricted to using the CS environment.

Those using the CS department, you can write your lisp in a file and use the function

(load "first.lsp") -- which loads the file first.lsp

Examples are: **HERE**

Documentation on racket's version of lisp called mzscheme can be found at **https://docs.racket-lang.org/guide (https://docs.racket-lang.org/guide/)**

You can use

(require trace) before you load other functions to see some tracing.

Problem Definition: In Digital Circuit Design, we wish to represent computer logic with the following list terms

```
C ->  ( AND C C)   |   (OR C C)
    |   (NOT C)
    | A[1-1000]
    | 1
    | 0
```

Examples include '(OR (AND A1 A2) 1) and '(NOT (AND 0 (OR A1 A2))) would be Circuit Descriptors (CD)

Given a CD, you are to write the following routines:

1) Write a function which counts the number of times a logical operator is used in a a CD, example(count-operator 'OR '((OR 1 (AND 1 A1))) would return 1

2) Write a function which uniquely lists all of the input VARIABLES .

3) Write a function that given a CD, reduces, the CD to a simpler form by using tautologies. Example (reduce '(OR 0 (AND A1 A2))) would yield (AND A1 A2) -- this can be tricky. We can reduce with the following identities: (AND 1 S) == S, (OR 0 S) == S, (AND 0 S) == 0, (OR 1 S) == 1, (NOT O) == 1, (NOT 1) == 0.

Deliverables

1) your name, and problem description.

2) Your count-operator function , with examples that it works

3) Your UNIQUE function with examples that it works

4) Your reduce Function wth examples that it works

ALL code needs to have proper documentation.