CSCE476/876 **Fall 2018**

Homework 1: Learning Lisp with the Adaptive Remote Agent

Assigned on: Friday, August 24^{th}, 2018.

Due: Friday, August 31^{st}, 2018.

Quiz: Friday, August 31^{st}, 2018 (in class).

The goal of this homework is that you learn the fundamentals of Lisp and experiment with the Adaptive Remote Agent available on the Web:

`http://art2.ph-freiburg.de/Lisp-Course`

1 Running the Adaptive Remote Agent

You are requested to login into the agent[1] and run the *first three (3) lessons* by Friday, August 31^{st}, 2018. A quiz will be given in class on Friday, August 31^{st}, 2018 with questions randomly taken from the tutorial. The quiz will count for 25 points of the homework.

2 Evaluating the Adaptive Remote Agent (20 points)

A short but substantive analysis in which you state what you learned from the web agent, how well you learned, what you found most helpful and what you found most difficult in your interactions with the agent. You need to be specific in your evaluation. Comments such as "a cool tool" are not be appropriate. Keep in mind that the Remote Agent was developed in Germany quite a few years ago (some typos or Germanism may exist), and it is made available for free by its designers for the benefit of everyone.

You analysis should be submitted as an ASCII file in electronic form using the web `handin` system. The file name should be <lastname>-ara.txt.

[1] Alert: The Adaptive Remote Agent was developed in Germany, and is made available for free for the benefit of the AI and Lisp community. Some language problems may persist, and the system is 'old' in terms of 'fashionable' interfaces. Those problems are known, and cannot be fixed. Please be patient about them, and focus on taking advantage of the good features of the software.

3 Research (25 points)

Every year the Loebner prize is awarded to the program that comes closest to passing a version of the Turing test. Research the Loebner prize and the Turing test. Report on the latest winner of the Loebner prize. What techniques does it use? How does it advance the state of the art in AI? etc.

4 First Steps in Common Lisp (30 points)

Complete the following 5 exercises. All lisp functions should be done using ACL in emacs. Hand in one file with your answers to all questions using the webhandin system. The file name should be <lastname>-lisp.txt

1. **Is the following an atom, list, both, or neither?** **(5 points)**

   (a) ATOM
   (b) (rest '(1 2 3))
   (c))(
   (d) (rest '())
   (e) ()

2. **Math** Evaluate the following functions. **(3 points)**

   (a) (/ (+ 5 7) (- 1 4))
   (b) (+ (* 3 4) (* 5 (first '(0 1 2))))
   (c) (MAX 3 (MIN 5 2 8))

3. **First/Rest** **(8 points)**
   Write the sequence of first's and rest's to get the number 3 from the list x. You may also use compound car/cdr's.

   Example: (setf x '(1 2 3 4))
   Answer: (first (rest (rest x))) or (caddr x)

   (a) (setf x '(1 (2 (3 (4)))))
   (b) (setf x '((1 2) (3 4)))
   (c) (setf x '(1 (2 3) 4))
   (d) (setf x '((((1) 2) 3) 4))

4. **Cond** **(4 points)**
   Define a function CHARACTERIZE-SIZE that takes a positive number n as an argument and returns SMALL if $n < 10$, MEDIUM if $10 \leq n < 50$, and BIG if $n \geq 50$

5. **Functions** **(Total 10 points)**

(a) NEGATIVE-P (2 points)
Define a predicate function NEGATIVE-P that takes a number as its argument and returns `t` if the number is negative.

(b) X5 (2 points)
Define a function X5 that takes one argument, tests whether the argument is a number, and returns the number times 5 otherwise returns the argument itself.

(c) MANIPULATE (6 points)
Define a function MANIPULATE that takes a list of numbers, and multiplies each negative number by 5, leaves every non-negative number as is, and returns the modified list.