Assignment 7: PROLOG   CS351—Fall 2008

Due 23:59 Sun 14-Dec-2008. Email *one text file* containing *all* your solutions to: barak+cs351-hw7@cs.nuim.ie. (This file should be loadable into `gprolog`, meaning essay question answers should be in comments.)

In this assignment we will use PROLOG (the `gprolog` implementation in particular) to do some list manipulation and to solve some puzzles.

1. Define `tripletwine` which is true when its first three arguments, interdigitated, are its last argument, as in the example below.

   ```
   tripletwine([a,b,c,d],[aa,bb,cc,dd],[aaa,bbb,ccc],[a,aa,aaa,b,bb,bbb,c,cc,ccc,d,dd]).
   ```

2. Explain what happens, and why, and how, when you enter this goal at the PROLOG prompt:

   ```
   append([a,b,E|X],[c,G|Y],[H,I,J,K,L,M,N]).
   ```

3. This problem involves the game tic-tac-toe.
   (a) Decide on a way to represent a tic-tac-toe board (a 3×3 board where each square can be blank or hold an "x" or an "o") as a PROLOG term. Describe this representation, in a comment in your file.
   (b) Define `won(`*board*`,`*player*`)` which is a relation that is true when *board* is a winning position (meaning three-in-a-row) for *player*, where *player* ∈ {x, o}.
   (c) Define `move(`*oldboard*`,`*newboard*`,`*player*`)` which is true if *newboard* is the same as *oldboard* except that *player* has put their mark in one blank spot.
   (d) Define `other(`*player1*`,`*player2*`)` which is true if *player1* and *player2* are opposite players.
   (e) Define `moves(`*list-of-boards*`,`*starting-player*`)` which is true if *list-of-boards* is a list of boards with successive boards being successive legal moves by alternating players, starting with the given player.
   (f) Use the above machinery to build an automatic tic-tac-toe player.

4. *(Optional)* If you encountered any problems with the assignment, or have any comments on it, or other comments or suggestions, I would appreciate hearing them. As practice for actual work, where weekly reports are not unusual, please embody these in a brief report.

Honor Code: You may discuss these with others, but please write your answers by yourself and without reference to communal notes. In other words, your answers should be *from your own head.*