CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 10
Maximum Points: 12
Due: 10:30 AM, Wednesday, April 15, 2009

April 8, 2008

Put your answers in a file named `hw10.`*ext*. **Include your name at the top of the file.** Submit that file by executing the Unix command

`submit_cse463 hw10.`*ext*

or

`submit_cse563 hw10.`*ext*

whichever is appropriate for you. The file can be a text file, or produced by some word processing software, but it must be formatted so it is easy to read. The file is to end with a transcript of a `demo` run of your program.

You are also to submit a single file of your SNePSLOG program for this homework set. Name this file `hw10.snepslog`.

1. In lecture, we discussed the notion of one relation's being the transitive closure of another (Chapter 7 of the lecture notes).
   (a) (3) Give the definition of `isTransitiveClosureOf` in SNePSLOG. (Use implication, rather than biconditional.)
   (b) (1) State in SNePSLOG that `isAncestorOf` is the transitive closure of `isParentOf`.
   (c) (2) State in SNePSLOG that Tom is the parent of Betty and Betty is the parent of Ted.
   (d) (3) Show the SNePSLOG run in which you provide the preceding information, and then issue the command
   ```
   askwh isAncestorOf(?x,?y)
   ```
2. "The reflexive closure of a binary relation R on a set X is the minimal reflexive relation R' on X that contains R. Thus $aR'a$ for every element a of X and $aR'b$ for distinct elements a and b, provided that aRb." [Weisstein, Eric W. "Reflexive Closure." From MathWorld–A Wolfram Web Resource. `http://mathworld.wolfram.com/ReflexiveClosure.html`]
   (a) (3) State in SNePSLOG the definition of `isReflexiveClosureOf(r2,r1)` over the domain of `Thing`.
   (b) (1) State in SNePSLOG that `isPartOf` is the reflexive closure of `isProperPartOf`.
   (c) (2) State in SNePSLOG that Tom's chest and Tom's heart are things, and that Tom's heart is a proper part of Tom's chest.
   (d) (3) Show the SNePSLOG run in which you provide the preceding information, and then ask (using `askwh`) what is a part of what.
   (e) (3) If you had to `askwh` twice, explain why.