CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 8
Maximum Points: 46
Due: 10:30 AM, Wednesday, April 1, 2009

March 25, 2009

For this homework set, you are to `submit` four files:

1. A file named `hw8a.prolog` containing your Prolog program for question (1).
2. A file named `hw8b.prolog` containing your Prolog program for question (2).
3. A file named `hw8c.prolog` containing your Prolog program for question (3).
4. A file named `hw8.`*ext* (for some appropriate *`ext`*) containing your name, your Prolog programs and copies of your Prolog runs. This 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 first two files are to end with commented versions of the Prolog versions of the questions, surrounded by Prolog's comment brackets, `/*` and `*/`. (Not including the period.)

1. (13)

   (a) (11) Express the following as a Prolog program.

   $\forall x \forall y[rides(x, y) \wedge \mathit{flies}(y) \Rightarrow airTraveler(x)]$
   $\forall x \forall y[rides(x, y) \wedge gallops(y) \Rightarrow landTraveler(x)]$
   $\forall x(hasWings(x) \Rightarrow \mathit{flies}(x))$
   $\forall x(horse(x) \Rightarrow gallops(x))$
   $hasWings(pegasus)$
   $hasWings(roc)$
   $horse(seabiscuit)$
   $horse(pegasus)$
   $rides(bellerophon, pegasus)$
   $rides(sinbad, roc)$
   $rides(red, seabiscuit)$

   (b) (2) Use your Prolog program to find out if someone is both an $airTraveler$ and a $landTraveler$.

2. (19)

   (a) (9) Express as a Prolog program the information that pizza, subs, and wings partition the category of prepared food.

   (b) (2) Include in your Prolog program the information that `item1` is a pizza.

   (c) (2) Include in your Prolog program the information that `item2` is a prepared food, but neither a pizza, nor a wing.

   (d) (2) Use your Prolog program to find out if `item1` is a prepared food. The answer should be `yes`.

   (e) (2) Use your Prolog program to find out if `item2` is a sub. The answer should be `yes`.

   (f) (2) Use your Prolog program to find out if `item1` is a wing. The answer should be `no`.

3. (14)

   (a) (6) Express as a Prolog program the information that the area of a rectangle is its base times its height, and that the area of a triangle is one-half its base times its height.

   (b) (2) Include in your Prolog program the information that figure `f1` is a rectangle, with base 5 and height 4.

   (c) (2) Include in your Prolog program the information that figure `f2` is a triangle, with base 6 and height 4.

   (d) (2) Use your Prolog program to calculate the area of `f1`.

   (e) (2) Use your Prolog program to calculate the area of `f2`.