CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 8
Maximum Points: 42
Due: 1:30 PM, Thursday, November 18, 2010

November 11, 2010

You must turn in the answers to this homework set in a submitted file by 1:30 PM on the date shown above.

The submitted file must be named hw8.*ext*, for an appropriate value of *ext*. **Include your name(s) and user name(s) at the top of the file.** Submit that file by executing the Unix command

```
submit_cse463 hw8.ext
```
or
```
submit_cse563 hw8.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.

You are also to submit the two SNePSLOG programs, `hw8q1.snepslog` and `hw8q2.snepslog`.

1. (16)

   (a) (9) Express the following as a SNePSLOG program called `hw8q1.snepslog`. It is recommended that the first two lines of your program be

   ```
   clearkb
   ^(setf *depthcutoffback* 3)
   ```
      i. (3) If two people believe the same thing, it's true.
      ii. (1) Tom believes that John is a driver.
      iii. (1) Betty believes that Mary is a driver.
      iv. (1) John believes that Mary is a driver.
      v. (3) Who are the drivers?

   (b) (6) Give the syntax and semantics of your atomic symbols in the following categories:
      i. (2) Individual constants
      ii. (2) Functions
      iii. (2) Predicates

   (c) (1) Put a transcript of the run of your SNePSLOG program here in your answer file, and submit `hw8q1.snepslog`.

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2. (26) In this exercise, you will create a partitioning of a category using reified categories, and test it in several ways. The basic notion comes from the idea that there may be several ways of partitioning the same category. For example, one partitioning of Human is Male vs. Female, and another is Child vs. Adult vs. Senior. We can create two "partitionings" of Human, say Sex and Age, and say that Male and Female are in the Sex partitioning, while Child, Adult, and Senior are in the Age partitioning.

(a) (19) Express the following as a SNePSLOG program called `hw8q2.snepslog`. It is recommended that the first two lines of your program be

```
clearkb
^(setf *depthcutoffback* 5)
```

    i. (3) The Big 3 is a partioning of the category of American cars.

    ii. (3) The categories of Chrysler cars, Ford cars, and GM cars are in the Big 3 partitioning.

    iii. (1) Car1 is a Chrysler car.

    iv. (3) Car2 is an American car, but neither a Chrysler car, nor a GM car.

    v. (3) Categories in a partitioning of a category are subcategories of the category: the general rule that if an instance, x is in a category, c, c is a member of a partitioning p, and p is a partitioning of a category s, then x is in the category s.

    vi. (3) Categories in a partitioning are mutually disjoint and exhaustive of their supercategory: the general rule that if an instance, x, is in some category, s, then it is in one and only one member of a partitioning, p, of s. (You are allowed to presuppose that the relevant partitioning contains 3 categories.)

    vii. (1) Is `car1` an American car? The answer should be `yes`.

    viii. (1) Is `car1` a GM car? The answer should be `no`.

    ix. (1) Is `car2` a Ford car? The answer should be `yes`.

(b) (6) Give the syntax and semantics of your atomic symbols in the following categories:

    i. (2) Individual constants

    ii. (2) Functions

    iii. (2) Predicates

(c) (1) Put a transcript of the run of your SNePSLOG program here in your answer file, and submit `hw8q2.snepslog`.