

## Homework #3: Chapters 9 and 10

The following exercises are due at the beginning of class on April 9. In addition to your answers to the problems, your submission should include printouts of your Prolog programs. You should also submit electronic copies of your programs by sending them as attachments in an e-mail to the TA (kex2@lehigh.edu).

1. Do exercise 9.1 from the book (p. 294). Note that you are not allowed to standardize apart the variables in the two sentences.
  
2. Consider the following knowledge base:
  - $\forall x,y \text{ cat}(x) \wedge \text{fish}(y) \Rightarrow \text{likesToEat}(x,y)$
  - $\forall x \text{ calico}(x) \Rightarrow \text{cat}(x)$
  - $\forall x \text{ tuna}(x) \Rightarrow \text{fish}(x)$
  - tuna(Charlie)
  - tuna(Herb)
  - calico(Puss)
  - a) Convert these wff's into a Prolog program.. Attach a printout of the program to your submission.
  - b) Write a Prolog query corresponding to the question, "What does Puss like to eat?" Find all answers to this question. Include a printout that shows the query and the program's response.
  
3. Consider the following sentences:
  - John likes all kinds of food.
  - Apples are food.
  - Chicken is food.
  - Anything anyone eats and isn't killed by is food.
  - Bill eats peanuts and is still alive.
  - Sue eats everything Bill eats.
  - a) Translate these sentences into first-order logic.
  - b) Convert the first-order logic sentences into a Prolog program. Attach a print out of the program to your submission.
  - c) Write a Prolog query that answers the question "Does John like peanuts?" Include a printout that shows the query and the program's response.
  - d) How can you use your Prolog program to find out all of the foods that John likes to eat? Include a printout of your interaction with the program.
  - e) Write a Prolog query that answers the question "What food does Sue eat?" Include a printout that shows the query and the program's response.

You must use SWI-Prolog (version 5.0.2) to answer exercises 2 and 3. SWI-Prolog is free software and can be downloaded from <http://www.swi-prolog.org/>. Both Linux and Windows versions are available. You should install it in your home directory or on a personal computer. In either case, you will need approximately 4 megabytes of free disk space to install the software. In many of the problems, you are asked to include a printout of your interaction with the program. You may simply copy this from SWI-Prolog's main window and paste it into a file for printing.