CS4061 Homework 2
Due Thursday, Nov 17

I. Brachman and Levesque give a Description Logic DL with concepts generated from atomic concepts, roles and constants as follows

```
concept ::= atomic-concept |
             [ALL role concept] |
             [EXIST integer role] |
             [FILLS role constant] |
             [AND concept . . . concept]
```

a. Translate the following English sentences to sentences in DL.
   (1) Every cat loves Percy and has a tail.
   (2) Everything that loves Percy eats only chicken.
   (3) Cosmic is a cat owned by Thomas.

b. Translate the DL sentences in part (a) to first-order logic.

c. Show how to use structure matching to prove that the DL sentences in part (a) entail that: Cosmic eats only chicken.

II. a. What is satisfiability and how are tableaux used to reason about it in description logic?

b. Illustrate your answer to part (a) by applying tableaux to check if “Pat knows a student that admires a non-student” is entailed by the facts:

```
know(pat,ann)
know(pat,bob)
admire(ann,bob)
admire(bob,chris)
student(ann)
¬student(chris)
```