

**CSCE 330 Fall 2014**  
**QUIZ 2**  
Assigned Tuesday, 14-09-16

1. Recall the (informal) definition of logical entailment:

A collection of sentences  $S_1, S_2, \dots, S_n$  logically entails another sentence  $S$  if the truth of  $S$  is implicit in the truth of the  $S_i$  sentences. (Therefore, the meaning of the terms in the  $S_i$  sentences do not matter in determining whether  $S$  is logically entailed by  $S_1, S_2, \dots, S_n$ .)

Consider the following knowledge base (KB), written as a Prolog program.

```
dog(X) :- poodle(X).
dog(X) :- collie(X).
poodle(X) :- poodle(X).
collie(fido).
```

Recall that Prolog uses back-chaining in answering queries.

- (a) The KB above logically entails `dog(fido)`. True or false? **Answer:** True.
- (b) The query `dog(fido)` will not succeed. True or false? **Answer:** True.
- (c) Back-chaining is complete on Prolog KBs. True or false? **Answer:** False.

2. Consider the following incorrect Prolog program.

```
% factorial(N,M) holds when M=Nx(N-1)x...x2x1 (and when N=0 and M=1).
factorial(0,1).
factorial(N,F) :- N>0, factorial(N,F1), F is N*N.
```

- (a) Does this program terminate? **Answer:** No.(It actually runs out of memory.)
- (b) Correct the second clause of the program so that it correctly computes the factorial. **Answer:**

```
factorial(0,1).
factorial(N,F) :- N>0, N1 is N-1, factorial(N1,F1), F is N*F1.
```