

Homework #1,
Information Integration, CSCI 6967-01
Due January 31, 2008 at 2pm

Question 1. You are given the following database. Compute its model using the fixpoint method. Show the newly added atoms at each step of the fixpoint operation.

$p(1)$
 $p(2)$
 $p(3)$
 $p(4)$
 $p(5)$
 $p(6)$
 $p(7)$
 $p(8)$
 $q(1, 3)$
 $q(2, 3)$
 $q(4, 1)$
 $q(5, 1)$
 $q(7, 4)$
 $q(8, 7)$
 $r(X, X, 1) : \neg p(X)$
 $r(X, Z, g(T)) : \neg r(X, Y, T), q(Y, Z)$

Question 2. Using the resolution algorithm given in class, find whether the following queries are true given the above database. Find all possible ways of solving these queries.

- a. $r(4, 3, g(g(1)))$
- b. $r(7, 3, g(g(1)))$
- c. $r(X, 3, g(g(T)))$
- d. $r(5, Y, T), r(Z, Y, T), 5 \ll Y$

Question 3. You are given the following data model:

Emp(SSN, Name, MgrSSN)
Proj(Id, Name, ProjLead) ProjLead is a foreign key to Emp(SSN)
ProjMember(Id, SSN) Id is a foreign key to Proj(Id),
 SSN is a foreign key to Emp(SSN)

Given this model, define the following relations using logical rules:

WorksUnder(Lead, Underling)
 where Lead is the leader of at least one project Underling works under
 Lead, Underling are both SSNs

WorksTogether(P1, P2)
 where P1, P2 both work on the same project, either P1 or P2 can be
 a lead, or P1,P2 can be both employees

DifferentProjects(P1, P2)
 where P1, P2 do not have any projects in common (either P1 or P2 can be
 a lead, or P1,P2 can be both employees)