1- What is meant by *Explanation* ? Compare between HOW and WHY Explanations.

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2**. Using the following facts**

1. Marcus was a man.
2. Marcus was a Pompeian.
3. All Pompeians were Romans.
4. Caesar was a ruler.
5. All Romans were either loyal to Caesar or hated him.
6. Everyone is loyal to someone.
7. People only try to assassinate rulers they are not loyal to.
8. Marcus tried to assassinate Caesar.

Answer the question, "Did Marcus hate Caesar?"

3. Trace the operation of the unification algorithm on each of the following pairs of literals

(a) f(Marcus) and f(Caesar)

(b) f(x) and f(g(y))

(c) *f(Marcus, g(x, y)) and f(x, g(Caesar, Marcus))*

4. 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 formulas in predicate logic
(b) Prove that John likes peanuts using backward chaining
(c) Convert the formulas of part a into clause form
(d) Prove that John likes peanuts using resolution
(e) Use resolution to answer the question, "What food does Sue eat?"

5. Consider the following facts:

- The members of the Elm St.-Bridge Club are Joe, Sally, Bill, and Ellen.
- Joe is married to Sally.
- Bill is Ellen's brother.
- The spouse of every married person in the club is also in the club.
- The last meeting of the club was at Joe's house.

(a) Represent these facts in predicate logic.

(b) From the facts given above, most people would be able to decide on the truth of the following additional statements:

- The last meeting of the club was at Sally's house.
- Ellen is not married.

Can you construct resolution proofs to demonstrate the truth of each of these statements given the five facts listed above? Do so if possible. Otherwise, add the facts you need and then construct the proofs.

6. Assume the following facts:

- Steve only likes easy courses.
- Science courses are hard.
- All the courses in the basketweaving department are easy.
- BK301 is a basketweaving course.

Use resolution to answer the question, "What course would Steve like?"

7. Consider the following knowledge base:

$\forall x : \forall y : cat(x) \wedge fish(y) \rightarrow likes\text{-}to\text{-}eat(x, y)$

$\forall x : calico(x) \rightarrow cat(x)$

$\forall x: tuna(x) \rightarrow fish(x)$

tuna(Charlie)

tuna(Herb)

calico (puss)

(a) Convert these wffs into Horn clauses.

(b) Convert the Horn clauses into a PROLOG program.

(c) Write a PROLOG query corresponding to the question, "What does Puss like to eat?" and show how it will be answered by your program.

(d) Write another PROLOG program that corresponds to the same set of wff's but returns a different answer to the same query.

8. A problem-solving search can proceed either forward (from a known start state to a desired goal state) or backward (from a goal state to a start state). What factors determine the choice of direction for a particular problem?