

Answer The following questions:

- 1) a) What is the difference between Satisfiable , Unsatisfiable and Valid Wffs?
b) write the clause for predicate `delete_all(Item, List, Final_List)`, which deletes all occurrences of the Item from the List to give the Final_List.
c) Apply forward chaining for the following sentences
Rule 1 IF The patient has a sore throat
AND We suspect a Bacterial infection
THEN We believe the illness is a strep throat
Rule 2 IF The patient's temperature is > 100
THEN the patient has a fever
Rule 3 IF the patient has been sick for over a month
AND the patient has a fever
THEN we suspect a bacterial infection
Fact 1 Temperature = 104°
Fact 2 Patient has been sick for 2 months
Fact 3 Patient has a sore throat
- 2) a) What is difference between?
i. backtracking and recursion ii. Internal goal and external goal
iii. predicates section and clauses section
b) What is the difference between Direct and Indirect Proofs?
c) Let $L(x, y)$ be the predicate "x likes y," and let the universe of discourse be the set of all people. Use quantifiers to express :
i. Everyone likes everyone. ii. Someone does not like anyone.
iii. There is no one whom everyone likes.
- 3) a) Write a program that changes a string to a list of characters. Try the goal `string_chlist("ABC", Z)` this goal will return Z bound to ['A', 'B', 'C'].
b) An engineer designed a specification for two traffic light posts positioned in the intersection of two one-way streets:
(i) Both the light posts have a green, a yellow and a red light. Exactly one of the lights in each light post is lit at all times.
(ii) Both green lights are not lit at the same time.
(iii) If one lamp post has the red light on, then the other has either the green or the yellow light on.
i) Formalize the above requirements as a set of propositional statements.
ii) Construct a truth table for the set of statements.
- c) Write a Prolog program using a predicate, `evenlist`, that takes two arguments. The first argument is a list of integers, while the second argument returns a list of all the even numbers found in the first list.
- 4) a) Write a Prolog program to write out the elements in a list with no more than nine elements per line.
b) Determine if the following are Tautology, Contradiction or Neither Tautology nor Contradiction. i- $((p \rightarrow q) \rightarrow q) \rightarrow q$ ii- $(p \rightarrow q) \leftrightarrow ((\neg p) \vee q)$
c) Explain the difference between the following pairs :
i. computational Logic and formal logic. ii. Induction and Abduction.
iii. consistent and inconsistent wffs.
- 5) a) Write a prolog program using the built-in predicate `findall` to print the average age of a group of people.
b) Find a clausal form for
 $(A \rightarrow ((A \rightarrow A) \rightarrow A)) \rightarrow ((A \rightarrow (A \rightarrow A)) \rightarrow (A \rightarrow A))$.
c) Use resolution to prove that there are no barbers, when
i) all barbers shave everyone who does not shave himself, and
ii) no barber shaves anyone who shaves himself.