12/11/24   Week 6

Create a knowledge base using propositial logic and show that the given query entails the knowledge base or not.

Algorithm:-

1. Input:
   - Knowledge Base (kb): A string representing logical rules using operators like ∧ (AND), ∨ (OR), ~(NOT), and parentheses (,).
   - Query (q): A logical expression whose entailment is checked against the knowledge base.
   - Combinations: All possible combinations of truth values for the variables p, q, and s.

2. Steps:
   - Conversion to Postfix Notation.
   - Evaluate the Postfix Expression.
     ~ (negation) flips the truth value.
     ∧ (conjunction) returns True only if both operands are True.
     ∨ (disjunction) returns True if at least one operand is True.
   - Truth Table Generation.
   - Check Entailment
     • The knowledge base (kb) is evaluated
     • The query (q) is evaluated
     • If for any combination, the kb evaluates to True, and the query evaluates to False, then the knowledge base does not entail the query. The function returns False.
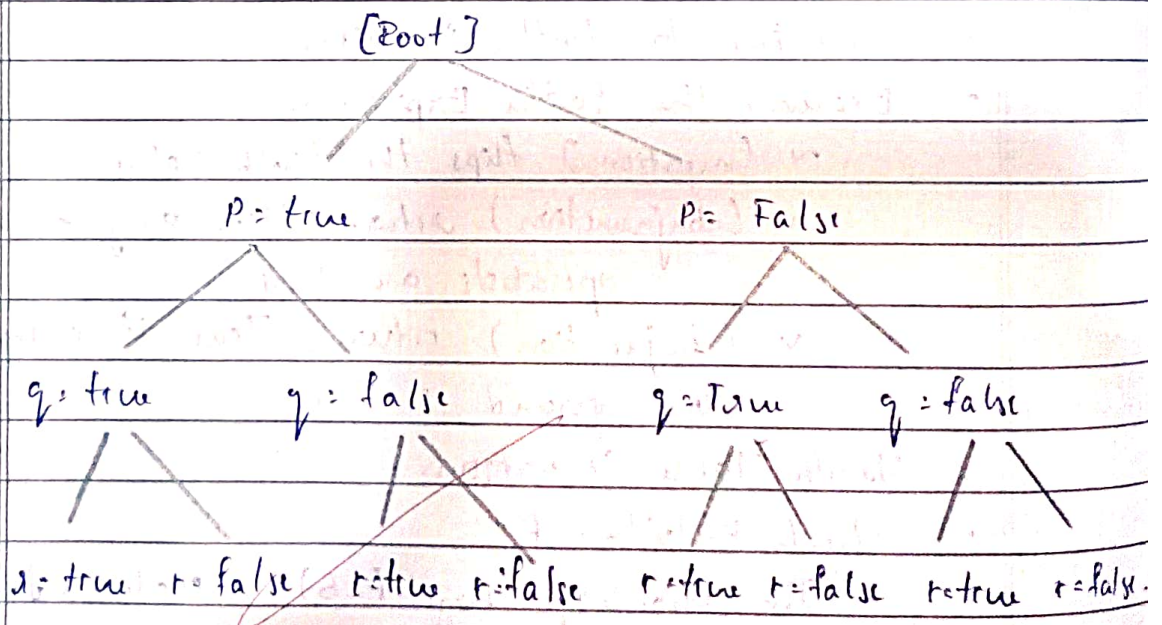
· If all combinations pass (i.e, whenever the knowledge base is True, the query is also True), the kb base entails the query, and the function returns true.

3. The program prints the result of the entailment check.

State Space Tree:

The state space tree for this problem can be thought of as a tree of possible truth assignments for the variables $p, q,$ and r.

Given that there are three variables (p, q, r) and each variable has two possible values (True or False)

[Root]

P : true   P : False

q : true   q : false   q : True   q : false

r : true   r : false   r : true   r : false   r : true   r : false   r : true   r : false.

Output:

Enter rule: p^q
Enter the Query: p

********* Truth Table Reference *********

&b	Alpha
True	True
True	True
False	True
False	True
False	False
False	False
False	False
False	False

The knowledge base entails the query.

12.11