

- 1) Create a knowledge base using propositional logic and show that the given query entails the knowledge base or not

### Algorithm

- Define combinations for all possible truth assignments for  $P, Q, R$
- Define priority for logical operators:  $\neg, \wedge, \vee, \rightarrow, \leftrightarrow$
- Define input function to read KB and query
- Define function to check if a character is an operand (operand)
- Define function to check if a character is a left or right parenthesis

Define function to convert infix expression to postfix expression.

- Initialize an empty stack
- Iterate through each character of the expression:
  - If it's an operand, add it to the postfix result
  - If it's an operator, handle precedence and push it to the stack
  - After finishing, pop any remaining operators from the stack

Define function to evaluate a postfix expression

- Initialize an empty stack
- For each character in the postfix expression:
  - If it's an operand, push the corresponding truth value based on the current combination
  - If it's an operator, pop operands, apply the operation and push the result
- Return the final result of the evaluation function to check entailment:

- For each truth assignment (combination) in combinations:
- Convert the KB and query to postfix expressions
- Evaluate the postfix expressions for the current comb

- If KB is true and query is false, return false
- If all combinations are checked and the query is true whenever KB is true, return True
- 9. Output whether the knowledge base entails the query.

### Output

Enter rule:  $P \vee \neg R$

Enter query:  $P \wedge Q \rightarrow R$

Truth table reference: line and a number

KB alpha

postfix KB:  $P \vee \neg R$

postfix query:  $P \wedge Q \rightarrow R$

True/False

postfix KB:  $P \vee \neg R$

postfix query:  $P \wedge Q \rightarrow R$

True/False

postfix KB:  $P \vee \neg R$

postfix query:  $P \wedge Q \rightarrow R$

False

postfix KB:  $P \vee \neg R$

postfix query:  $P \wedge Q \rightarrow R$

True/False

The knowledge base does not entail the query