University of the People

CS4408 Artificial Inteligence

Unit 5 Written Assignment 5

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**Programming Assignment**This program implements a truth table generator for the logical formulas given in the assignment. The three Boolean variables—P, Q, and R—represent the propositions “It is hot,” “It is humid,” and “It is raining,” respectively. The program dynamically generates all 8 combinations of truth values using nested loops.

For each combination, the following expressions are computed:

* **(P ^ Q) => R**: This is evaluated by first taking the conjunction of P and Q (i.e., P ^ Q) and then applying the implication rule (i.e., if the antecedent is false, the implication is true; if the antecedent is true, the result is R).
* **Q => P**: This is computed similarly by applying the implication rule.
* **KB**: Defined as the conjunction of the three parts—(P ^ Q) => R, Q => P, and Q.
* **KB => R**: This checks whether the knowledge base (KB) implies R.

We define separate functions for conjunction and implication to ensure our code clearly represents these logical operators. The program then prints the results in a neatly formatted table (with appropriate alignment, padding, and no duplicate columns) to match the assignment’s requirements.

### Evaluation

* **Dynamic Generation:** The program uses nested loops to generate all 8 combinations for P, Q, and R.
* **Logical Operators:** Custom functions for conjunction and implication are defined to clearly represent the logic rules.
* **Efficient Data Structure:** Boolean values are computed and stored in temporary variables and printed directly, which is efficient for this small dataset.
* **Output Formatting:** The table headers and rows are formatted with fixed column widths to ensure proper alignment.

Output

