Program 6 : Knowledge Base Entailment

Code:

```
from sympy import symbols, And, Not, Implies, satisfiable

def create_knowledge_base():
    # Define propositional symbols
    p = symbols('p')
    q = symbols('q')
    r = symbols('r')

    # Define knowledge base using logical statements
    knowledge_base = And(
        Implies(p, q),        # If p then q
        Implies(q, r),        # If q then r
        Not(r)                # Not r
    )

    return knowledge_base

def query_entails(knowledge_base, query):
    # Check if the knowledge base entails the query
    entailment = satisfiable(And(knowledge_base, Not(query)))

    # If there is no satisfying assignment, then the query is entailed
    return not entailment

if __name__ == "__main__":
    # Create the knowledge base
    kb = create_knowledge_base()

    # Define a query
    query = symbols('p')

    # Check if the query entails the knowledge base
    result = query_entails(kb, query)

    # Display the results
    print("Knowledge Base:", kb)
    print("Query:", query)
    print("Query entails Knowledge Base:", result)
```

Observation:

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Knowledge Based Entailement

```
// from Sympy import symbols, And, Not, Implies, satisfiable
// not used

def create knowledge_base():
    p = symbols('p')
    q = symbols('q')
    r = symbols('r')
    knowledgebase = And(Implies(p, q), Implies(q, r),
                        Not(r))
                  # (p→q) ∧ (q→r) ∧(¬r)
    return knowledgebase

def query_entaild knowledge_base, query):
    entailment = satisfiable (And(Knowledge_Base, Not
    // return not entailment (Query)))
if - name_ == "_main_":
    kb = create_knowledge_base()
    query = symbols('p')
    result = query_ entails (kb, query)
    print ("Knowledge Base", kb)
    print ("Query", query)
    print ("Query entails knowledgebase,' result)
```

def implies(q, r):
    if pq then r

return all(expr for expr in kb) and not query

// α ⊨ β i.e. Alpha (α) is said to entail β, if in every model where α is true, β is true
A give logic / argument is said to be satisfiable if it satisfies for some logic
α ⊨ β if (α ∧ → β)

Output:

```
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Knowledge Base: ~r & (Implies(p, q)) & (Implies(q, r))
Query: p
Query entails Knowledge Base: False
```