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AI LAB TEST 2 WRITE UP

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Q Given: $P \Rightarrow Q$ $R \Rightarrow S$

Prove: $P \vee R \Rightarrow Q \vee S$ * (check end for conversion to CNF)

Program for resolution:

```
kb = []
def CLEAR():
    global kb
    kb = []

def TELL(sent):
    global kb
    if isClause(sent): kb.append
```

```
def disjunctify(clauses):
    disjuncts = []
    for clause in clauses:
        disjuncts.append(tuple(clause.split('v')))
    return disjuncts

def getResolvants(ci, cj, di, dj):
    resolvent = list(ci) + list(cj)
    resolvent.remove(di)
    resolvent.remove(dj)
    return tuple(resolvent)
```

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```
def resolve(ci, cj):
    for di in ci:
        for dj in cj:
            if di == '~' + dj + dj == '~' + di:
                return getResolvent(ci, cj, di, dj)
    return [ci, cj]

def checkResolution(clauses, query):
    clauses += [query if query.startswith('~') else '~' + query]
    proposition = '^'.join(['(' + clause + ')' for clause in clauses])
    clauses = disjunctify(clauses)
    resolved = False
    new = set()

    while not resolved:
        n = len(clauses)
        pairs = [(clauses[i], clauses[j]) for i in range(n) for j in range(i+1, n)]

        for (ci, cj) in pairs:
            resolvent = resolve(ci, cj)
            if not resolvent:
                resolved = True
                break

        new = new.union(set(resolvent))
        if new.issubset(set(clauses)): break

        for clause in new:
            if clause not in clauses:
                clauses.append(clause)
```

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if resolved: print("KB Entails query")
else: print("KB doesn't entail query")

Given rules =
i) $P \Rightarrow Q$
ii) $R \Rightarrow S$

T.P. $\Rightarrow$ $P \vee R \Rightarrow Q \vee S$

As given in the question, converting to CNF

$P \vee R \Rightarrow Q \vee S$

$\sim(P \vee R) \vee (Q \vee S)$

~~$\sim P \wedge \sim R$~~ $\sim P \wedge \sim R \vee Q \vee S$ ⟵ Query

Rule 1: $P \Rightarrow Q$ → $\sim P \vee Q$ ⟵ Rule 1

Rule 2: $R \Rightarrow S$ → $\sim R \vee S$ ⟵ Rule 2