Lab-7

Entailment Process

Q. KB:
1. Alice is the mother of Bob
2. Bob is the father of Charlie.
3. A father is a parent
4. A mother is a parent
5. All parents have children
6. If someone is a parent, their children are siblings.
7. Alice is married to David

Hypothesis:

→ "Charlie is a sibling of Bob

Entailment Process:

- From the premise, Alice is the mother of Bob, so Alice is a parent.
- Bob is the father of Charlie, so, Charlie's parent is Bob.
- From the premise, If someone is a parent, their child

$A \rightarrow B$ (Alice is mother of Bob)

$B \rightarrow C$ (Bob is father of Charlie)

$F \rightarrow P$ (A father is a parent)

$M \rightarrow P$ (A mother is a parent)

$P \rightarrow S$ (If someone is a parent, their children are siblings)

$A \wedge B \rightarrow Q$ (If Alice is mother of Bob & Bob is father of Charlie then Charlie is a sibling of Bob)

→ Check for entailment:

1. If A(Alice is mother of Bob) is true, then B(Bob is the father of Charlie) must also be true
   $(A \rightarrow B)$

2. If B is true then C(Bob is a parent) must be true $(F \rightarrow F)$ & M(Alice is a parent) must also be true $(M \rightarrow P)$

3. If both Alice & Charlie are parents (i.e M & F are true) then S(their children are sibling) must be true. $(P \rightarrow S)$

4. Since S is true, the hypothesis Q ("Charlie is sibling of Bob") is true.

Conclusion:
Using Propositional logic, we can conclude the hypothesis "Charlie is a sibling of Bob" is entailed by KB (Knowledge Base).