소프트웨어학과 201620914 이휘진 **HW-1**

① $\neg(A \lor B) \Leftrightarrow \neg A \land \neg B$

| A | B | $\neg A$ | $\neg B$ | $A \lor B$ | $\neg(A \lor B)$ | $\neg A \land \neg B$ | $\neg(A \lor B) \Leftrightarrow \neg A \land \neg B$ |
|---|---|---|---|---|---|---|---|
| t | t | f | f | t | f | f | t |
| t | f | f | t | t | f | f | t |
| f | t | t | f | t | f | f | t |
| f | f | t | t | f | t | t | t |

② $(A \lor B) \land (\neg B \lor C) \Rightarrow (A \lor C)$ $\Rightarrow \neg((A \lor B) \land (\neg B \lor C)) \lor (A \lor C)$

| $A$ | $B$ | $C$ | $\neg B$ | $A \lor B$ | $\neg B \lor C$ | $(A \lor B) \land (\neg B \lor C)$ | $\neg((A \lor B) \land (\neg B \lor C))$ | $A \lor C$ | $(A \lor B) \land (\neg B \lor C) \Rightarrow (A \lor C)$ |
|---|---|---|---|---|---|---|---|---|---|
| t | t | t | f | t | t | t | f | t | t |
| f | f | f | t | f | t | f | t | f | t |
| f | f | t | t | f | t | f | t | f | t |
| f | t | t | f | t | t | t | f | t | t |
| f | t | f | f | t | f | f | t | t | t |
| t | t | f | f | t | f | f | t | t | t |
| t | f | f | t | t | t | t | f | t | t |
| t | f | t | t | t | t | t | f | t | t |

B. Transform the following statement into conjunctive normal form. (2 Points)

$A \land (A \Rightarrow B) \Rightarrow B$

CNF) $A \land (\neg A \lor B) \Rightarrow B$

$(A \land \neg A) \lor (A \land B)$

$(A \land B) \Rightarrow B$

$\neg(A \land B) \lor B$

$= (\neg A \lor \neg B) \lor B$

$= (\neg A \lor B) \lor \cancel{(\neg B \lor B)}$

$= (\neg A \lor B)$ ← disjunction

$= \neg(A \land \neg B)$ answer

C. Consider the following knowledge base (KB).

KB = {(A), (B), (C), (D), (E), (A ∧ B ∧ C ⇒ F), (C ∧ F ∧ E ⇒ H)}

1 2 3 4 5 6 7

Show KB ⊨ H by SLD resolution-refutation. (4 Points)

claim: KB ⊨ H ⇒ KB ∧ ¬H

Res (6, 1) : $(B \land C \Rightarrow F)_8$

Res (8, 2) : $(C \Rightarrow F)_9$

Res (9, 3) : $(F)_{10}$

Res (10, 7) : $(C \land E \Rightarrow H)_{11}$

Res (11, 3) : $(E \Rightarrow H)_{12}$

Res (12, 5) : $(H)_{13}$

$+ (\neg H)_{14}$

Res (14, 13) : $(\,)_{15}$ → From there we derive the empty clause using resolution

Thus the claim has been proved.