

Practice Examination 1 Solutions

CS 313H

- [10]** Using a truth table prove that $((p \vee q) \Rightarrow r) \Leftrightarrow ((p \Rightarrow r) \wedge (q \Rightarrow r))$
- [20]** Using the rules of Sentential Calculus conclude $(P \wedge \sim B) \Rightarrow C$ from the premises $A \vee (B \vee C)$ and $P \Rightarrow \sim A$.
- [20]** Prove that the conclusion $(A \Rightarrow D) \vee (C \Rightarrow B)$ follows from the premise $(A \Rightarrow B) \vee (C \Rightarrow D)$. First convert the premises and the negation of the conclusion into Conjunctive Normal Form, and then employ a resolution proof to get a contradiction.

- [10]** Using the predicates:

Bx x is a loaf of bread,
 Hx x is a pound on hamburger,
 Cxy x costs more than y dollars,
 Px x is a person,
 Exy x eats y ,
 Tx x is tofu.

Express in the syntax of Predicate Calculus:

“If some loaf of bread costs more than \$4 and some pound of hamburger costs more than \$8 then the only thing everyone eats is tofu.”

- [25]** Prove that $(\forall w)(\exists z)R_{zw}$ follows from $(\exists x)(\forall y)R_{xy}$ (Rather than using the TC rule be specific about the sentential calculus rule.)