Fifth Problem Set

Aaron Rosen

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Problem 1

Assuming
$\not\models \neg A \Rightarrow$ there exists some truth assignment, v such that $\bar{v}(\neg A) = F$, $\bar{v}(A) = T$
$\not\models B \Rightarrow$ there exists some truth assignment, w such that $\bar{w}(B) = F$
No conjunct of A is a disjunct of B

For truth assignment v, every conjunct of A must evaluate to true. If one conjunct in A were also a disjunct of B then $\bar{v}(B) = T$. However, this contradicts our original assumption that no conjunct of A is a disjunct of B. Therefore $A \not\models B$.

For truth assignment w, every disjunct of B must evaluate to false. If one disjunct of B were a conjunct of A then $\bar{w}(A) = F$. This, too contradicts our original assumption that no conjunct of A is a disjunct of B. Therefore $A \not\models B$

Problem 2

(a)

$\forall x$ So$(x) \to$ (G$(x) \leftrightarrow$ M(x))

(b)

$\forall x[S(x) \wedge \exists y D(xy)] \to J(y)$

(c)

$(\exists x S(x) \wedge G(x)) \wedge (\forall x S(x) \to (F(x) \wedge M(x)))$

(d)

$A(xy) :=$ x is after y
$\forall x(I(x) \to \exists y(A(xy)))$

(e)

$\forall x \forall y[(I(x) \wedge I(y)) \wedge \neg(= xy)] \to (A(xy) \vee A(yx) \wedge \neg(A(xy) \wedge A(yx)))$

(f)

$\neg[\exists x(I(x) \to (\forall y(Y(y) \to A(yx)))]$

(g)

$\neg[\exists x(I(x) \to \neg(\exists y(I(y) \to A(xy))))]$

(h)

$B(xy) :=$ x is before y
$\forall x \forall y((I(x) \wedge I(y)) \to (A(xy) \to B(yx)))$