

Phil 225 – Symbolic Logic  
HW 8 – Week of April 4, 2011

Monday, Apr 4: Read 12.1 – 12.3

Wed, Apr 6: Read 12.4, 13.1-13.3

Fri, Apr 8: do the following. You may want to use Fitch to check proofs. You may use TautCon freely, but not FO-Con or AnaCon.

1. For each part, derive the last sentence from the previous ones.

a)  $\forall x \forall y Fxy$   
 $\forall x \forall y Fyx$

b)  $\forall x (Fx \wedge Gx)$   
 $\forall x Fx \wedge \forall x Gx$

c)  $\forall x Fx \vee \forall x Gx$   
 $\forall x (Fx \vee Gx)$

d)  $\forall x (Fx \rightarrow (Gx \vee Hx))$   
 $Ga \leftrightarrow (Ha \wedge \neg Ga)$   
 $\neg Fa$

e)  $\forall x \forall y \forall z ((Fxy \wedge Fyz) \rightarrow Fxz)$   
 $\forall x \neg Fxx$   
 $\forall x \forall y (Fxy \rightarrow \neg Fyx)$

f)  $\forall x (Fx \vee Gx)$   
 $\exists x \neg Gx$   
 $\forall x (Hx \rightarrow \neg Fx)$   
 $\exists x \neg Hx$

2) Derive the last sentence from the others as premises.

$$\begin{array}{l} \forall x \exists y Fxy \\ \forall x \forall y (Fxy \rightarrow Gyy) \\ \forall x \forall y (Fxy \rightarrow Fyx) \\ \hline \forall x Gxx \end{array}$$

3) Exactly one of the sentences (a) and (b) is a consequence of the given sentences. Identify clearly which one is a consequence, and give a derivation of it from the others as premises. For the one that is not a consequence, show that it is not by giving an appropriate interpretation.

$$\begin{array}{l} \forall x \forall y (Fxy \rightarrow Gy) \\ \forall x (Gx \rightarrow \neg Hxx) \\ \exists x Hxx \end{array}$$

(a)  $\exists x \forall y \neg Fyx$

(b)  $(\forall x)(\exists y)Fxy$