Phil 225 -- Symbolic Logic
HW 9
Due 4/13/12

(1) For each of (a) and (b) below, if it is a consequence of (1) - (4), show that it is by giving a derivation. If it is not a consequence, show that it is not with a suitable interpretation.

(1) $(x)(y)(Fxy \rightarrow (\exists z)Gxz)$
(2) $(\exists x)(\exists y)Fxy$
(3) $(x)(y)(Fxy \rightarrow (z)Fxz)$
(4) $(x)(y)(Fxy \rightarrow (\exists z)Fyz)$

(a) $(x)(\exists y)Gyx$ (b) $(x)(\exists y)Gxy$

(2) Derive the last sentence from the first two, without using rule T.

$P \rightarrow (Q \vee R)$
$\sim Q \rightarrow P$
$Q \rightarrow (R \wedge S)$
_____
R

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

$(\exists x)(\exists y)(Fxy \wedge Gya)$
$(x)[(\exists y)Fxy \rightarrow (z)Gxz]$
$(x)(y)(z)(Gxy \rightarrow Gyz)$
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$(x)(y)Gxy$

4) For each of the following, decide whether it is valid. If it is, give a derivation of it from the empty set of premises. If it is not, show that it is not by giving a suitable interpretation.

(a) $[(x)Fx \wedge (\exists y)(Gy \vee Hy)] \rightarrow [(x)\sim Gx \rightarrow (\exists y)(Fy \wedge Hy)]$
(b) $(\exists x)[(\exists y)Fxy \wedge (x)(y)(Fxy \rightarrow Gyy)] \rightarrow (x)(\exists y)Gxy$
(c) $(\exists x)(Fx \rightarrow (x)Fx)$