RYERSON UNIVERSITY
MTH 714 LAB#8
DAY: OCTOBER 30, 2008

1. For the following formula, either prove that it is valid or give a falsifying interpretation

$$\forall x \forall y \forall z [p(x,x) \wedge (p(x,z) \rightarrow (p(x,y) \vee p(y,z)))] \rightarrow \exists y \forall z p(y,z).$$

2. Show that

$$\forall x(p(x) \vee q(x)) \rightarrow (\forall x p(x) \vee \forall x q(x))$$

is not valid using the semantic tableaux method.

3. Prove, in the Hilbert proof system for predicate logic, that

$$\vdash \exists x(p(x) \rightarrow q(x)) \rightarrow (\forall x p(x) \rightarrow \exists x q(x)).$$

4. What is wrong with the following "proof" of

$$\{\exists x A(x), \exists x B(x)\} \vdash \exists x(A(x) \wedge B(x))?$$

1.	$\{\exists x A(x), \exists x B(x)\} \vdash \exists x A(x)$	Assumption
2.	$\{\exists x A(x), \exists x B(x)\} \vdash A(c)$	C-Rule 1
3.	$\{\exists x A(x), \exists x B(x)\} \vdash \exists x B(x)$	Assumption
4.	$\{\exists x A(x), \exists x B(x)\} \vdash B(c)$	C-Rule 3
5.	$\{\exists x A(x), \exists x B(x)\} \vdash A(c) \wedge B(c)$	Conjunction Rule 2,4
6.	$\{\exists x A(x), \exists x B(x)\} \vdash \exists x(A(x) \wedge B(x))$	Existential Rule 5