RYERSON UNIVERSITY
MTH 714
ASSIGNMENT #2 (due: November 24)

1. Exercise 4 from 5.9

2. Prove that the formula

$$\exists x(B(x) \to C(x)) \to (\forall x B(x) \to \exists x C(x))$$

   is valid in predicate calculus using

   (a) the method of semantic tableaux

   (b) Hilbert proof system $\mathcal{H}$

3. Find the clausal form of the formula

$$\forall z \exists y(P(y, g(y), z) \vee \neg\forall x Q(x)) \wedge \neg\forall z \exists x \neg R(f(x, z), z)$$

4. Apply the unification algorithm to the pair of literals

$$\neg P(f(z, g(a, y)), h(z)), \quad \neg P(f(f(u, v), w), h(f(a, b)))$$

   to determine if this pair can be unified. If so, find the most general unifier σ. Here, P is a binary predicate symbol, f and g are binary function symbols, while h is a unary function symbol.

5. Determine, using resolution, whether the following set of clauses is satisfiable or not:

$$\{\{\neg P(x), \neg P(f(a)), Q(y)\}, \{P(y)\}, \{\neg P(g(b, x)), \neg Q(b)\}\}$$