Assignment 1

Due: February 10, 2010, no later than 3:00pm

Objective: The main goal of your first assignment is for you to practice propositional and predicate calculus. Unless stated otherwise, you may use truth tables to establish the logical equivalence of the propositions. Please understand that the assignment is strictly personal and giving/receiving undue help is a violation of the Honor Code of Old Dominion University and will be dealt with accordingly.

Statement of your assignment:

Problem 1. [20%] Determine formally\(^1\) whether

\[ [p \land (p \rightarrow q)] \rightarrow q \]

is a tautology.

Problem 2. [20%] Show using truth tables that

\[ (p \rightarrow q) \land (q \rightarrow r) \rightarrow (p \rightarrow r) \]

is a tautology.

Problem 3. [20%] Show using truth tables that

\[ (p \land q) \rightarrow (p \rightarrow q) \]

is a tautology.

Problem 4. [20%] Show using formal derivation that

\[ (p \land q) \rightarrow (p \rightarrow q) \]

is a tautology.

Problem 5. [20%] Determine whether

\[ \forall x [P(x) \rightarrow Q(x)] \]

and

\[ \forall x (P(x)) \rightarrow \forall x (Q(x)) \]

are logically equivalent. Justify your answer.

\(^1\)That is, by using the properties of logical connectives