CSci 1302 Assignment 3
Due Wedn., Feb 8th in class

Problem 1 (9 points). Prove the following equivalences:

    1. $(p \to q) \wedge (p \to r) \wedge p \equiv p \wedge q \wedge r$

    2. $p \to (q \to r) \equiv (p \wedge q) \to r$

    3. $p \leftrightarrow (q \wedge r) \equiv (p \to q) \wedge (p \to r) \wedge (\tilde{\ }p \to \tilde{\ }(q \wedge r))$

Problem 2 (4 points). Exercises 10, 11 p. 41.

Problem 3 (6 points). Exercises 42, 44 p. 43. Note that t here is just a name of a proposition, not a tautology.

Problem 4 (12 points). Prove the following using deductive proofs (not truth tables).

    1. $(p \vee q) \to r$

        $\overline{}$

        $\therefore \tilde{\ }r \to \tilde{\ }p$

    2. $\tilde{\ }(p \to q)$

        $p \to r$

        $\overline{\phantom{\tilde{\ }(p \to q)}}$

        $\therefore r$

    3. $(p \wedge q) \leftrightarrow r$

        $\overline{}$

        $\therefore (r \to p) \wedge (r \to q)$

Problem 5 (6 points). Which of the following two arguments are valid (if any)? Justify your answer the following way: use deductive proofs or truth tables to prove a valid argument; show at least one row of a truth table to disprove an invalid argument.

You might want to guess the answer first, and then check your intuition.

        $A.$ $(p \vee q) \to s$

              $\overline{}$

              $\therefore q \to s$

        $B.$ $(p \wedge q) \to s$

              $\overline{}$

              $\therefore q \to s$