CSci 1302 Assignment 3  
Due Wed., February 15th in class

Problem 1 (20 points). Prove the following using deductive proofs (not truth tables).

1. \((p \lor q) \rightarrow r\)
   
   \(\therefore r \rightarrow \neg p\)

2. \(\neg(p \rightarrow q)\)
   
   \(p \rightarrow r\)
   
   \(\therefore r\)

3. \(p \land \neg r\) (use proof by contradiction)
   
   \(q \rightarrow r\)
   
   \(\therefore (p \rightarrow q)\)

4. \((p \land q) \leftrightarrow r\)
   
   \(\therefore (r \rightarrow p) \land (r \rightarrow q)\)

5. \((p \lor q) \leftrightarrow r\)
   
   \(\therefore (p \rightarrow r) \land (q \rightarrow r)\)

Problem 2 (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 the truth table to disprove an invalid argument.

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

A. \((p \lor q) \rightarrow s\)
   
   \((q \lor r) \rightarrow s\)
   
   \(\therefore q \rightarrow s\)

B. \((p \land q) \rightarrow s\)
   
   \((q \land r) \rightarrow s\)
   
   \(\therefore q \rightarrow s\)

Problem 3 (4 points). Exercises 6 and 8 p. 55.

Problem 5 (6 points). Exercises 27, 29 p. 56.

Problem 6 (4 points). Exercises 33a, 34a pp. 56-57.