

CSci 1302 Assignment 3

Due Wedn., February 15th in class

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

1.
$$\frac{(p \vee q) \rightarrow r}{\therefore \sim r \rightarrow \sim p}$$
2.
$$\frac{\sim(p \rightarrow q) \quad p \rightarrow r}{\therefore r}$$
3.
$$\frac{p \wedge \sim r \quad (p \rightarrow q) \rightarrow r}{\therefore \sim(p \rightarrow q)}$$
 (use proof by contradiction)
4.
$$\frac{(p \wedge q) \leftrightarrow r}{\therefore (r \rightarrow p) \wedge (r \rightarrow q)}$$
5.
$$\frac{(p \vee q) \leftrightarrow r}{\therefore (p \rightarrow r) \wedge (q \rightarrow r)}$$

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.
$$\frac{(p \vee q) \rightarrow s \quad (q \vee r) \rightarrow s}{\therefore q \rightarrow s}$$
- B.
$$\frac{(p \wedge q) \rightarrow s \quad (q \wedge r) \rightarrow s}{\therefore q \rightarrow s}$$

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

Problem 4 (5 points). Exercises 15, 17, and 19 p. 55.

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

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