

CSci 1302 Assignment 2
Due Wedn., September 15, 2004

Note: the symbol \Leftrightarrow stands for logical equivalence.

Problem 2 (8 points (part 1 is 2 points, the other two parts are 3 points each)). Exercise 3.8 pp. 42-43.

Problem 3 (5 points). Exercise 3.9 p. 43, Part 2 (you don't need to suggest an application for this digital circuit).

Problem 4 (12 points). Use truth tables to prove or disprove the following:

- A. $p \Rightarrow (q \vee r) \Leftrightarrow (p \Rightarrow q) \vee (p \Rightarrow r)$
- B. $p \Rightarrow (q \wedge r) \Leftrightarrow (p \Rightarrow q) \wedge (p \Rightarrow r)$
- C. $(p \vee q) \Rightarrow r \Leftrightarrow (p \Rightarrow r) \vee (q \Rightarrow r)$
- D. $(p \wedge q) \Rightarrow r \Leftrightarrow (p \Rightarrow r) \wedge (q \Rightarrow r)$

Problem 5 (6 points). Given the Negation law, both De Morgan's laws, and the Distributivity law $p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$, prove the second Distributivity law:

$$p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r).$$

Use a transformational proof, not truth tables.

Hint: use the same approach as in the proofs in Example 4.3.

Problem 6 (4 points). Exercise 4.4 p. 54.