

## Discrete Math Homework 3

**Due Wednesday, February 1 at the beginning of class**

General instructions:

- Use standard size paper (8.5 by 11).
- Answer each question in order using a single column.
- Be neat. If we cannot read your solution it is wrong.
- Show your work. If you just write an answer, you will get minimal credit even if the answer is correct.

**Question A)** Rosen 1.1 Exercise 28 (p. 15)

**Question B)** Rosen 1.1 Exercise 30 (p. 15).

### Rosen section 1.3.

**Question C)** Use a truth table to verify the logical equivalence

$$(p \rightarrow q) \vee r \equiv p \rightarrow (q \vee r)$$

**Question D)** Use the logical equivalences in Table 6 and  $p \rightarrow q \equiv \neg p \vee q$  to show that the following is true

$$(p \rightarrow q) \vee r \equiv p \rightarrow (q \vee r)$$

**Question E)** Use the logical equivalences in Table 6 and  $p \rightarrow q \equiv \neg p \vee q$  to show that the following is true

$$(T \rightarrow (q \vee \neg r)) \wedge \neg(p \rightarrow F) \equiv (r \rightarrow q) \wedge p$$

**Question F)** Rosen 1.3 Exercise 8 c, d (p. 35).

**Question G)** Rosen 1.3 Exercise 10 a, d (p. 35).

### Rosen section 1.4.

**Question H)** Rosen 1.4 Exercise 8 a, b (p. 53)

**Question I)** Rosen 1.4 Exercise 2 (p. 53)

**Question J)** Rosen 1.4 Exercise 6 a, e, f (p. 53)

**You may choose to solve one (and only one) of the following Extra Credit Problems. If you submit more than one, only the first will be graded.**

**Extra Credit 1)** Prove or disprove that the following two compound propositions are logically equivalent.

$$(p \rightarrow (q \vee \neg r)) \wedge q$$
$$(q \wedge s) \vee ((p \leftrightarrow q) \oplus \neg p)$$

**Extra Credit 2)** Rosen 1.2 Exercise 46 (p. 16) - Hint: See problem 45 for the meaning of Not in this particular Fuzzy Logic system.

**Extra Credit 3)** Rosen 1.3 Exercise 50 (p. 36) – Hint: Use the result of question 45 to show part c.