Name (PRINTED): _____

Student ID #: _____

Section #: _____

CMSC 250 Quiz #3 ANSWERS Wed., Feb. 8, 2006

1. [16 pnts.] For each of the following, answer the short answer question given.

   a. Explain the truth value relationships between the original statement and the contrapositive of that original statment.

      ANSWER: The original statement and its contrapositive are logically equivalent.
      OR In every possible interpretation they have the same truth value.

   b. Explain the truth value relationships between the original statement and the converse of that original statment.

      ANSWER: The truth original statement and the truth value of its converse are not related at all.
      OR In any interpretation, if one is true the other could be true or it could be false.

   c. Explain how you can tell if an argument is valid by looking at a truth table that has already been created to represent all of the statements involved in the argument.

      ANSWER: Look at the critical rows. If any one critical row has a false conclusion, the argument is invalid. If none of the critical rows have a false conclusion, the argument is valid.
      NOTE: A critical row is defined as those that have true for all of the premises.

   d. Would it be possible to have a valid argument whose conclusion is a contradiction (something that is always false)? If yes, explain how. If no, explain why not.

      ANSWER: Yes - it is possible. If there are no critical rows, you can not find a critical row that has a false conclusion. The only way to have an invalid argument is to find a critical row that has a false conclusion.

Prove each of the arguments on the next page using only the rules from Chapter 1 (These are the same as the rules on the handout attached). Make sure you are using only those rules. For each line, make sure you tell the statement known to be true, the rule used to get that statement, and the line numbers to which the rule was applied to get that statement.

↓ TURN OVER ↓

2. [7 pnts.]

P1	p
P2	$p \to q$
P3	$\sim q \vee r$
	therefore r

#	Statement	Rule	Lines Used
1	q	Modus Ponens	P1, P2
2	$\sim (\sim q)$	Double Neg	1
3	r	Disjunctive Syllogism	2,P3

3. [7 pnts.]

P1	$p \to (r \wedge x)$
P2	$q \to (r \wedge m)$
P3	$p \vee q$
	therefore r

#	Statement	Rule	Lines Used
1	$\sim p \vee (r \wedge x)$	def of implication	P1
2	$(\sim p \vee r) \wedge (\sim p \vee x)$	Distribution	1
3	$\sim p \vee r$	conjunctive simplification	2
4	$p \to r$	def of implication	3
5	$\sim q \vee (r \wedge m)$	def of implication	P2
6	$(\sim q \vee r) \wedge (\sim q \vee m)$	Distribution	5
7	$\sim q \vee r$	conjunctive simplification	6
8	$q \to r$	def of implication	7
9	r	Dilemma	4,8,P3