CMSC 250 Homework 2 (0201 & 0202) Fall 2005

Due Wed Sept. 14 at the beginning of your discussion section.

You must write the solutions to the problems single-sided on your own lined paper, with all sheets stapled together, and with all answers written in sequential order or you will lose points.

1. Give the negations of the following statements applying DeMorgan's Law to make sure no compound statement is negated.
   (a) Fords and Chevys are good cars.
   (b) Either Sue won't go to the wedding or Fred will.
   (c) Neither the Sun nor the Moon are heavenly bodies.

2. For each of the following statements, give its inverse, converse and contrapositive. You may change verb tenses to make so that the statements sound right.
   (a) If it rains in Spain, then it is May.
   (b) Good times will follow if you go to a party.
   (c) If trees are blooming, then it's spring.
   (d) You will pass only if you work hard.

3. Write the complete truth table for each of the following:
   (a) $(p \to q) \vee (\sim r \wedge p)$.
   (b) $a \leftrightarrow (b \wedge \sim c)$

4. For each of the following state the <u>one</u> single rule from Theorem 1.1.1 (page 14) or Table 1.3.1 (Page 39) that could be used to go directly from the statement(s) to the conclusion, or "none" if there is no such rule.
   (a) statement: $(p \to q) \wedge p$
   conclusion: q.
   (b) statements: $p \to q$
   p
   conclusion: q.
   (c) statements: $a \to b$
   $\sim a \to c$
   conclusion: $b \vee c$
   (d) statements: $a \to b$
   $a \vee c$
   conclusion: $c \to b$

5. Use a truth table to determine if the following argument is valid or not. State whether or not it is valid, and give your reasons why it is valid or not.

P1	$p \vee q$
P2	$r \rightarrow q$
P3	$\sim p \rightarrow \sim r$
Therefore	$\sim p$

6. Use the rules of inference you were given to prove the following:

(a)

P1	$r \vee s$
P2	$y \rightarrow \sim s$
P3	$\sim (y \wedge w)$
P4	$\sim p \rightarrow \sim r$
P5	$w \rightarrow \sim s$
P6	$y \vee w$
Therefore	$p \vee x$

(b)

P1	$a \vee (b \wedge m)$
P2	$(a \vee b \vee g) \rightarrow d$
P3	$(a \vee m) \rightarrow (\sim e \rightarrow f)$
P4	$\sim f$
Therefore	$(d \vee h) \wedge (e \vee h)$

(c)

P1	$x \rightarrow y$
P2	$\sim y \vee q$
P3	$(r \wedge \sim q) \vee g$
Therefore	$\sim g \rightarrow \sim (x \vee \sim r)$