Name (PRINTED): ______________________

Student ID #: ______________________

Section # (or TA's: name and time) ______________________

CMSC 250 Quiz #3 ANSWERS Wed., Sept. 15, 2004

1. [12 pnts.] Prove that the following argument is valid by using the rules. Apply only the rules from Theorem 1.1.1 and Table 1.3.1 and the other things listed on the "cheat sheet". You must tell the name of the rule as you apply it and what line numbers contained the statements used to apply the rule.

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

#	Statement	Rule	Lines Used
1	$\sim p \vee q$	Commutative	P1
2	$p \to q$	Def of Impl.	1
3	$\sim r \vee \sim q$	Def of Impl.	P2
4	$\sim q \vee \sim r$	Commutative	3
5	$q \to \sim r$	Def of Impl.	4
6	$p \to \sim r$	Hypothetical Syll.	2,5
7	$\sim p \vee \sim r$	Def of Impl.	6
8	$\sim p \vee r$	Def of Impl.	P3
9	$(\sim p \vee \sim r) \wedge (\sim p \vee r)$	Conjunctive Add.	7,8
10	$\sim p \vee (\sim r \wedge r)$	Distributive	9
11	$\sim p \vee c$	Negation Law	10
12	$\sim p$	Identity	11

or

#	Statement	Rule	Lines Used
1	$\vert p$	Assume	
2	$\vert r$	Modus Ponens	1,P3
3	$\vert \sim q$	Modus Ponens	2,P2
4	$\vert \sim q \wedge p$	Conjunctive Add	1,3
5	$\vert \sim (q \vee \sim p)$	DeMorgan's	4
6	$\sim p$	Closing Cond Wrld w/ Contradiction	1-5 p1,5

↓ TURN OVER ↓

2. [12 pnts.] Prove that the following argument is valid by using the rules. Apply only the rules from Theorem 1.1.1 and Table 1.3.1 and the other things listed on the "cheat sheet". You must tell the name of the rule as you apply it and what line numbers contained the statements used to apply the rule.

P1	$p \vee r$
P2	$\sim(q \wedge \sim r)$
	therefore $(p \to q) \to r$

#	Statement	Rule	Lines Used
1	$\sim q \vee \sim\sim r$	DeMorgan's	P2
2	$\sim q \vee r$	Double Neg	1
3	$(p \vee r) \wedge (\sim q \vee r)$	Conjunctive Add	P1,2
4	$(p \wedge \sim q) \vee r$	Distributive	3
5	$\sim(p \wedge \sim q) \to r$	Def of Impl.	4
6	$(\sim p \vee \sim\sim q) \to r$	DeMorgan's	5
7	$(\sim p \vee q) \to r$	Double Neg	6
8	$(p \to q) \to r$	Def of Impl.	7

or

#	Statement	Rule	Lines Used
1	$\sim q \vee \sim\sim r$	DeMorgan's	P2
2	$\sim q \vee r$	Double Neg	1
3	$\sim p \to r$	Def of Impl.	P1
4	$q \to r$	Def of Impl.	2
5	$\quad\quad\quad \mid p \to q$	Assume	
6	$\quad\quad\quad \mid \sim p \vee q$	Def of Impl.	5
7	$\quad\quad\quad \mid r$	Dilemma	3,4,6
8	$(p \to q) \to r$	Close of Conditional Wrld	5-7

3. [6 pnts.] For each of the following identify the rule being applied or tell that it is not one of those listed on the "cheat sheet".

a.

If I stay up late at night, then I wil be tired in the morning.	
I am not tired this morning.	MODUS TOLLENS
Therefore I did not stay up late last night.	

b.

Either I study or I like football.	
If I like football, then I like mathematics.	NONE
If I don't study, then I like mathematics.	

c.

If I work hard, then I earn lots of money.	
If I earn lots of money, then I pay high taxes.	NONE
If I pay high taxes, then I have worked hard.	