Name (PRINTED): ______________________

Student ID #: ______________________

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

CMSC 250 Quiz #5 ANSWERS Wed., Sept. 29, 2004

Write all answers legibly in the space provided. The number of points possible for each question is indicated in square brackets – the total number of points on the quiz is 30, and you will have exactly 15 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz.

1. [6 pnts.] Use an Euler diagram to determine if each of the following represents a valid argument. Make sure to label the parts of the diagram.

No children like me. All people who like me are under 3 feet tall. ——— therefore: No children are under 3 feet tall.	Some pigs fly. All things that fly migrate. ——— therefore: Porky Pig (one of the pigs) must migrate.
Circle One: `Valid` `(Invalid)`	Circle One: `Valid` `(Invalid)`
circle for people who like me must be disjoint from circle of chilren circle of people who like me must be completely contained inside circle of people under 3 feet tall, but overlapping with circle of children	Circle of pigs must be overlapping with circle of things that fly circle of things that fly must be completely contained in the circle of things that migrate, but some of the pig circle must stick out Porky pig is in that sticking out area of the pig circle

2. [10 pnts.] For each of the following, translate the argument to symbolic notation using quantification. The quantification must indicate that the objects come from the domain "U" which includes all things. Then tell if the argument given matches the form: Universal Modus Ponens, Universal Modus Tollens, or NONE (if it matches neither). You must use a universal quantifier if at all possible since that is the only way it could directly match one of these argument forms.

Premises: Conclusion:	No dogs like cats. Snoopy does not like cats. ———————— Snoopy is not a dog.	$\forall x \in U, D(x) \rightarrow \sim L(x)$ $\sim L(snoopy)$ —————— $\sim P(snoopy)$
Argument Form: NONE		

Premises: Conclusion:	All dogs have 2 ears and eat Alpo. Snoopy is a dog. ———————— Snoopy has 2 ears.	$\forall x \in U, D(x) \rightarrow (E(x) \wedge A(x))$ $D(snoopy)$ —————— $E(snoopy)$
Argument Form:NONE		

↓ TURN OVER ↓

3. [14 pnts.] For each of the following prove that it is a Valid Argument by telling what rules would need to be applied. You may assume a is an element in $\mathbf{D}$.

a.

P1	$\forall x \in D, \sim(\sim M(x) \wedge \sim Q(x))$
P2	$\forall y \in D, Q(y) \rightarrow \sim P(y)$
P3	$P(a)$
	$- - - - - - - - - - - - - - -$
	therefore $R(a) \vee M(a)$

Line #	Logical Statement	Name of Rule	Line Numbers Used
1	$\sim\sim P(a)$	Double Neg	P3
2	$\sim Q(a)$	$\forall$ MT	1,P2
3	$\sim(\sim M(a) \wedge \sim Q(a))$	$\forall$ instantiation	P1
4	$\sim\sim M(a) \vee \sim\sim Q(a)$	DeMorgan's	3
5	$M(a) \vee Q(a)$	Double Neg	4
6	$M(a)$	$\vee$Syllogism	2,5
7	$R(a) \vee M(a)$	$\vee$ addition	6

b.

P1	$\forall x \in D, P(x) \rightarrow Q(x)$
P2	$\forall x \in D, R(x) \rightarrow \sim Q(x)$
P3	$\exists y \in D, R(y) \wedge M(y)$
P4	$\forall y \in D, \sim R(y) \rightarrow \sim M(y)$
	$- - - - - - - - - - - - - - -$
	therefore $\forall m \in D, \sim(P(m) \wedge M(m))$

Line #	Logical Statement	Name of Rule	Line Numbers Used
1	$\|P(a)$	Assume	
2	$\|Q(a)$	$\forall$ MP	1,P1
3	$\| \sim R(a)$	$\forall$ MT	2,P2
4	$\| \sim M(a)$	$\forall$ MP	P4,3
5	$P(a) \rightarrow \sim M(a)$	Closing of the conditional World	1-5
6	$\sim P(a) \vee \sim M(a)$	Def of implication	5
7	$\sim(P(a) \wedge M(a))$	DeMorgan's	6
8	$\forall m \in D, \sim(P(a) \wedge M(a))$	$\forall$ Generalization	7