CMSC 250 Quiz #5 ANSWERS Wed., Feb. 25, 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. [10 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.

Only cats are nice. Some cats are yellow. therefore: Some yellow things are nice.
Circle One: `Valid` `(Invalid)`

Some people are frightened things. All frightened things act strange. therefore: All people act strange.
Circle One: `Valid` `(Invalid)`

↓ TURN OVER ↓

2. [6 pnts.] Write either "$\forall MP$" or "$\forall MT$" or "$\forall instantiation$" to tell which rule was used to reach the conclusion shown or say that the argument is "not valid" by any of these. You must use the Universe of all things as your domain for any quantified variables, you may use "b" as a name (instantiation) to represent Bessy, and you may ignore any "double negation" considerations. Predicates: C(x)= "x is a cow", G(x) = "x eats grass", T(x) = "x is a tiger", and P(x) = "x is a good pet".

a)	All cows eat grass. Bessy my pet eats grass. therefore Bessy is a cow	$\forall x \in U, C(x) \rightarrow G(x)$ G(b) C(b)	NOT VALID
b)	No tigers eat grass. Bessy my pet eats grass. therefore Bessy is not a tiger.	$\forall x \in U, T(x) \rightarrow \sim G(x)$ G(b) $\sim T(b)$	$\forall MT$
c)	All grass eating things make good pets. Bessy my pet eats grass. therefore Bessy is a good pet.	$\forall x \in U, G(x) \rightarrow P(x)$ $G(b)$ $P(b)$	$\forall MP$

3. [14 pnts.] Use the handout of the "Logical Equivalence Rules" and the "Rules of Inference" to prove the following. It is a **Valid Argument** - you need to prove it without using a truth table.

P1	$\forall x \in D, P(x) \wedge Q(x)$
P2	$\forall y \in D, R(y) \rightarrow \sim Q(y)$
P3	$\forall z \in D, \sim P(z) \vee M(z)$
P4	$P(a)$ where $a \in D$
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	therefore $\exists x \in D, M(x) \wedge \sim R(x)$

Line #	Logical Statement	Name of Rule	Line Numbers Used
1	$\sim P(a) \vee M(a)$	$\forall Instantiation$	P3
2	$\sim\sim P(a)$	Double Neg	P4
3	$M(a)$	Disjunctive Syll.	1,2
4	$P(a) \wedge Q(a)$	$\forall Instantiation$	P1
5	$Q(a)$	Conjunctive Simp	4
6	$\sim\sim Q(a)$	Double Negative	5
7	$\sim R(a)$	$\forall MT$	P2,6
8	$M(a) \wedge \sim R(a)$	Conjunctive Add.	3,7
9	$\exists x \in D, M(x) \wedge \sim R(x)$	Existential Gen.	8