MAD 2104: Practice Test 1

1. Rewrite the following using variables:

"Given any two real numbers, there is a real number in between."

2. Let A={c, d, f, g}, B={f, j}, and C={d, g}. Answer yes or no for the following questions:

a. Is $B \subseteq A$?

b. Is $C \subseteq A$?

c. Is C a proper subset of A?

3. Consider the statement forms $(p \vee q) \vee (p \wedge r)$ and $(p \vee q) \wedge r$.
Fill in the truth table showing each form:

p	q	r	
T	T	T	
T	T	F	
T	F	T	
T	F	F	
F	T	T	
F	T	F	
F	F	T	
F	F	F	

Are they logically equivalent? _____

4. Use De Morgan's law to write the negation of: x < 2 or x > 5.

5. Write the negation of: "If today is New Year's Eve then tomorrow is January."

6. For the statement "If the decimal expansion of r is terminating then r is rational", give the

a. Inverse

b. Contrapositive

7. Construct a truth table for: $(p \to r) \leftrightarrow (q \to r)$.

p	q	r	
T	T	T	
T	T	F	
T	F	T	
T	F	F	
F	T	T	
F	T	F	
F	F	T	
F	F	F	

8. Write the truth table for the following argument. You should have a column for each premise and for the conclusion. Circle the critical rows.

$p \to q \vee r$
$\sim q \vee \sim r$
$\therefore \sim p \vee \sim r$

p	q	r	
T	T	T	
T	T	F	
T	F	T	
T	F	F	
F	T	T	
F	T	F	
F	F	T	
F	F	F	

Is the argument valid?_____

9. Let P(x) be the predicate "x > 1/x". What is the truth set of P(x) if the domain of x is $\mathbb{R}$.

10. Rewrite the following:

a. “All rectangles are quadrilaterals”

∀ _____ x, x _____.

b. “Some sets have 16 subsets”

∃ _____ x such that _____.

11. Consider the statement “∀ real numbers *x*, if $x^2 \geq 1$ then $x > 0$.”

a. Write the negation of the statement.

b. Write the converse of the statement.