

Quiz #3 10/23/09

Name: _____

Directions: Make sure to read each problem carefully. To receive full credit, you must show all of your work.

Problem 1. Consider the statement

”If John is purple, then he is a mathematician.”

a. (2 points) State the contrapositive of this implication.

”If John is not a mathematician, then he is not purple.”

b. (2 points) State the converse of this implication.

”If John is a mathematician, then he is purple.”

Problem 2. (5 points) Simplify the statement

$$(-p \vee -q) \wedge (F_0 \vee p) \wedge p$$

using the Laws of Logic we’ve discussed.

1.	$(-p \vee -q) \wedge (F_0 \vee p) \wedge p \Leftrightarrow (-p \vee -q) \wedge p \wedge p$	Identity Law
2.	$(-p \vee -q) \wedge p \wedge p \Leftrightarrow (-p \vee -q) \wedge p$	Idempotent Law
3.	$(-p \vee -q) \wedge p \Leftrightarrow p \wedge (-p \vee -q)$	Commutative Law
4.	$p \wedge (-p \vee -q) \Leftrightarrow (p \wedge -p) \vee (p \wedge -q)$	Distributive Law
5.	$(p \wedge -p) \vee (p \wedge -q) \Leftrightarrow F_0 \vee (p \wedge -q)$	Inverse Law
6.	$F_0 \vee (p \wedge -q) \Leftrightarrow p \wedge -q$	Identity Law

Problem 3. (5 points) Establish the validity of the argument

$$\begin{array}{l} p \rightarrow q \\ (q \wedge r) \rightarrow s \\ r \\ \hline \therefore p \rightarrow s \end{array}$$

using the Rules for Inference we've discussed.

1.	$\neg(q \wedge r) \vee s$	Substitution
2.	$\neg q \vee \neg r \vee s$	DeMorgan's Law + Substitution
3.	$\neg q \vee s$	Modus Tollens
4.	$q \rightarrow s$	Substitution
5.	$p \rightarrow s$	Law of Syllogism