Math 150

Section 3.2 Truth Tables and Equivalent Statements

Truth Table for $\sim p$

p	$\sim p$
T	F
F	T

Truth Table for $p \wedge q$

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

Truth Table for $p \vee q$

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

Example 1 Construct a truth table for the compound statement: $r \vee (p \wedge \sim q)$

Theorem A logical statement having n components will have 2^n rows in its truth table.

Two statements are equivalent if they have the same truth value in every possible situation. (Notation: $p \equiv q$ means p is equivalent to q.)

De Morgan's Laws

$$\sim (p \wedge q) \equiv \sim p \vee \sim q$$

$$\sim (p \vee q) \equiv \sim p \wedge \sim q$$

Example 2 Show that $p \equiv \sim (\sim p)$.

Example 3 Show that $\sim (p \wedge q) \equiv \sim p \vee \sim q$.

Example 4 Show that $\sim (p \vee q) \equiv \sim p \wedge \sim q$.

Example 5 Negate "I am not going or she is going."