CSPB 2824 - Stade - Discrete Structures

Charts and information you will have on the exam if needed. (copy)

TABLE 6 Logical Equivalences.

Equivalence	*Name*
$p \wedge \mathbf{T} \equiv p$ $p \vee \mathbf{F} \equiv p$	Identity laws
$p \vee \mathbf{T} \equiv \mathbf{T}$ $p \wedge \mathbf{F} \equiv \mathbf{F}$	Domination laws
$p \vee p \equiv p$ $p \wedge p \equiv p$	Idempotent laws
$\neg(\neg p) \equiv p$	Double negation law
$p \vee q \equiv q \vee p$ $p \wedge q \equiv q \wedge p$	Commutative laws
$(p \vee q) \vee r \equiv p \vee (q \vee r)$ $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$	Associative laws
$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$ $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$	Distributive laws
$\neg(p \wedge q) \equiv \neg p \vee \neg q$ $\neg(p \vee q) \equiv \neg p \wedge \neg q$	De Morgan's laws
$p \vee (p \wedge q) \equiv p$ $p \wedge (p \vee q) \equiv p$	Absorption laws
$p \vee \neg p \equiv \mathbf{T}$ $p \wedge \neg p \equiv \mathbf{F}$	Negation laws

ill have the complete list of axioms from Rosen page A-1 and ...

Two additional axioms tell us that for every real number, tl
added to this number to produce 0, and for every nonzero real
by which it can be multiplied to produce 1. These are the *inver*

- **Inverse law for addition** For every real number x, ther
  the *additive inverse* of x) such that $x + (-x) = (-x) +$
- **Inverse law for multiplication** For every nonzero re
  number $1/x$ (called the *multiplicative inverse* of x) such

The final algebraic axioms for real numbers are the *distr*
multiplication distributes over addition; that is, that we obtain tl
a pair of real numbers and then multiply by a third real numb
these two real numbers by the third real number and then add t

- **Distributive laws** For all real numbers x, y, and z,
  $(x + y) \cdot z = x \cdot z + y \cdot z$.

TABLE 1 **Rules of Inference.**

Rule of Inference	*Tautology*	*Name*
p $p \to q$ $\therefore q$	$(p \land (p \to q)) \to q$	Modus p
$\neg q$ $p \to q$ $\therefore \neg p$	$(\neg q \land (p \to q)) \to \neg p$	Modus tc
$p \to q$ $q \to r$ $\therefore p \to r$	$((p \to q) \land (q \to r)) \to (p \to r)$	Hypothet
$p \lor q$ $\neg p$ $\therefore q$	$((p \lor q) \land \neg p) \to q$	Disjuncti
p $\therefore p \lor q$	$p \to (p \lor q)$	Addition
$p \land q$ $\therefore p$	$(p \land q) \to p$	Simplific
p q $\therefore p \land q$	$((p) \land (q)) \to (p \land q)$	Conjunct
$p \lor q$ $\neg p \lor r$ $\therefore q \lor r$	$((p \lor q) \land (\neg p \lor r)) \to (q \lor r)$	Resolutic