CS 2209A
Cheat sheet for midterm

Rules of inference:

p $p \to q$ $\_ \_ \_ \_ \_ \_ \_ \_$ q	Modus ponens
$\neg q$ $p \to q$ $\_ \_ \_ \_ \_ \_ \_ \_$ $\neg p$	Modus tollens
p $\_ \_ \_ \_ \_ \_ \_$ $p \vee q$	Addition
$p \wedge q$ $\_ \_ \_ \_ \_ \_ \_$ p	Simplification

p q $- - - - - - - - - -$ $p \wedge q$	Conjunction
$p \to q$ $q \to r$ $- - - - - - - - - - - -$ $p \to r$	Hypothetical Syllogism
$p \vee q$ $\neg p$ $- - - - - - - - - -$ q	Disjunctive Syllogism
$p \vee q$ $\neg p \vee r$ $- - - - - - - - - - - -$ $q \vee r$	Resolution

Laws of propositional logic

Idempotent laws:	$p \vee p \equiv p$	$p \wedge p \equiv p$
Associative laws:	$(p \vee q) \vee r \equiv p \vee (q \vee r)$	$(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$
Commutative laws:	$p \vee q \equiv q \vee p$	$p \wedge q \equiv q \wedge p$
Distributive laws:	$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$	$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$
Identity laws:	$p \vee F \equiv p$	$p \wedge T \equiv p$
Domination laws:	$p \wedge F \equiv F$	$p \vee T \equiv T$
Double negation law:	$\neg\neg p \equiv p$	
Complement laws:	$p \wedge \neg p \equiv F, \neg T \equiv F$	p $\vee \neg p \equiv T, \neg F \equiv T$
De Morgan's laws:	$\neg(p \vee q) \equiv \neg p \wedge \neg q$	$\neg(p \wedge q) \equiv \neg p \vee \neg q$
Absorption laws:	$p \vee (p \wedge q) \equiv p$	$p \wedge (p \vee q) \equiv p$
Conditional identities:	$p \to q \equiv \neg p \vee q$	$p \leftrightarrow q \equiv (p \to q) \wedge (q \to p)$