

CSE 191 Reference Sheet

Equivalence	Name	Inference	Name
$p \wedge T \equiv p$ $p \vee F \equiv p$	Identity Laws	$\frac{p}{p \Rightarrow q}$ $\therefore q$	Modus Ponens
$p \vee T \equiv T$ $p \wedge F \equiv F$	Domination Laws	$\frac{\neg q}{p \Rightarrow q}$ $\therefore \neg p$	Modus Tollens
$p \vee p \equiv p$ $p \wedge p \equiv p$	Idempotent Laws	$\frac{p \Rightarrow q}{q \Rightarrow r}$ $\therefore p \Rightarrow r$	Hypothetical Syllogism
$\neg(\neg p) \equiv p$	Double negation law	$\frac{p \vee q}{\neg p}$ $\therefore q$	Disjunctive Syllogism
$p \vee q \equiv q \vee p$ $p \wedge q \equiv q \wedge p$	Commutative Laws	$\frac{p}{\therefore p \vee q}$	Addition
$(p \vee q) \vee r \equiv p \vee (q \vee r)$ $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$	Associative Laws	$\frac{p \wedge q}{\therefore p}$	Simplification
$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$ $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$	Distributive laws	$\frac{p}{q}$ $\therefore p \wedge q$	Conjunction
$\neg(p \vee q) \equiv \neg p \wedge \neg q$ $\neg(p \wedge q) \equiv \neg p \vee \neg q$	De Morgan's Laws	$\frac{p \vee q}{\neg p \vee r}$ $\therefore q \vee r$	Resolution
$p \vee (p \wedge q) \equiv p$ $p \wedge (p \vee q) \equiv p$	Absorption Laws		
$p \vee \neg p \equiv T$ $p \wedge \neg p \equiv F$	Negation Laws		

Equivalences with Implication	Equivalences with Bidirectional Implication
$p \Rightarrow q \equiv \neg p \vee q$	$p \iff q \equiv (p \Rightarrow q) \wedge (q \Rightarrow p)$
$p \Rightarrow q \equiv \neg q \Rightarrow \neg p$	$p \iff q \equiv q \iff p$
$p \vee q \equiv \neg p \Rightarrow q$	$p \iff q \equiv \neg p \iff \neg q$
$p \wedge q \equiv \neg(p \Rightarrow \neg q)$	$p \iff q \equiv (p \wedge q) \vee (\neg p \wedge \neg q)$
$\neg(p \Rightarrow q) \equiv p \wedge \neg q$	$\neg(p \iff q) \equiv p \iff \neg q$
$(p \Rightarrow q) \wedge (p \Rightarrow r) \equiv p \Rightarrow (q \wedge r)$	
$(p \Rightarrow q) \wedge (p \Rightarrow r) \equiv (p \vee q) \Rightarrow r$	
$(p \Rightarrow q) \vee (p \Rightarrow r) \equiv p \Rightarrow (q \vee r)$	
$(p \Rightarrow q) \vee (p \Rightarrow r) \equiv (p \wedge q) \Rightarrow r$	