PROPOSITIONAL LOGIC (Helpful Hints)

Negation ~ (not)
The negation has the opposite truth value of the original

Conjunction & (and, but, while, even though)
The conjunction is true if and only if both parts are true

Disjunction v (or, unless)
The disjunction is true if either part is true

Conditional → (if…then…)
The conditional is false if and only if the antecedent (the if part) is true and the consequent (the then part) is false
The word "if" used alone introduces the antecedent of a conditional
The phrase "provided" or "provided that" acts like an "if"
The phrase "only if" introduces the consequent, it acts like "then"

"If and only if" = (P→Q) & (Q→P)

Necessary conditions are consequent of conditionals (only if)
Sufficient conditions are antecedents of conditionals (if)
"Either" indicates that the terms that follow it should be grouped

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COMMON FALLACIES (see also p 329)

Affirming the Consequent (fallacious version of Modus ponens)
P→Q
Q
P

Denying the Antecedent (fallacious version of Modus tollens)
P→Q
~P
~Q

Undistributed Middle (fallacious version of Chain Argument)
P→Q
R→Q
P→R

These three are all Fallacies

DEDUCTION (see also p 341)

MP Modes ponens (affirming the antecedent)
$P \rightarrow Q$
P

Q

MT Modus tollens (denying the consequent)
$P \rightarrow Q$
$\sim Q$

$\sim P$

CA Chain argument (Hypothetical syllogism)
$P \rightarrow Q$
$Q \rightarrow R$

$P \rightarrow R$

DA Disjunctive argument
$P \vee Q$
$\sim P$

Q

SIM Simplification
$P \& Q$

P

CONJ Conjunction
P
Q

$P \& Q$

ADD Addition
P

$P \vee Q$

DN Double Negation
$P \leftrightarrow \sim\sim P$

CD Constructive dilemma
$P \rightarrow Q$
$R \rightarrow S$
$\underline{P \vee R}$
$Q \vee S$

DD Destructive dilemma
$P \rightarrow Q$
$R \rightarrow S$
$\underline{\sim Q \vee \sim S}$
$\sim P \vee \sim R$

COM Commutation
$(P \& Q) \leftrightarrow (Q \& P)$
$(P \vee Q) \leftrightarrow (Q \vee P)$

IMPL Implication
$(P \rightarrow Q) \leftrightarrow (\sim P \vee Q)$

CONTR Contraposition
$(P \rightarrow Q) \leftrightarrow (\sim Q \rightarrow \sim P)$

DEM DeMorgan's Law
$\sim(P \& Q) \leftrightarrow (\sim P \vee \sim Q)$
$\sim(P \vee Q) \leftrightarrow (\sim P \& \sim Q)$

EXP Exportation
$[P \rightarrow (Q \rightarrow R)] \leftrightarrow [(P \& Q) \rightarrow R]$

ASSOC Association
$[P \& (Q \& R)] \leftrightarrow [(P \& Q) \& R]$
$[P \vee (Q \vee R)] \leftrightarrow [(P \vee Q) \vee R]$

DIST Distribution
$[P \& (Q \vee R)] \leftrightarrow [(P \& Q) \vee (P \& R)]$
$[P \vee (Q \& R)] \leftrightarrow [(P \vee Q) \& (P \vee R)]$

TAUT Tautology
$(P \vee P) \leftrightarrow P$ OR $(P \& P) \leftrightarrow P$