

1. Definition of a sentence of PL

Rule 0: All capital English letters on their own are sentences of PL.

Rule 1: If φ is a PL-sentence, then $\neg \varphi$ is a PL-sentence.

Rule 2: If φ and ψ are PL-sentences, then:

- + $(\varphi \wedge \psi)$ is a PL-sentence
- + $(\varphi \vee \psi)$ is a PL-sentence
- + $(\varphi \supset \psi)$ is a PL-sentence
- + $(\varphi \equiv \psi)$ is a PL-sentence

Rule 3: Nothing else is a PL-sentence.

2. Truth table definitions of the logical operators

p	q	$\neg p$	$(p \wedge q)$	$(p \vee q)$	$(p \supset q)$	$(p \equiv q)$
T	T	F	T	T	T	T
T	F	F	F	T	F	F
F	T	T	F	T	T	F
F	F	T	F	F	T	T

3. Inference Rules

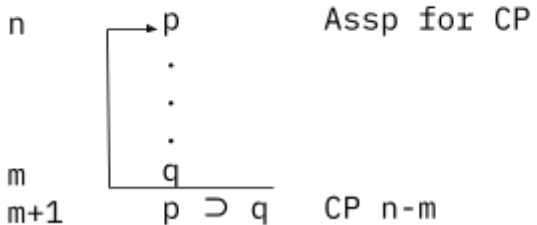
MP $p \supset q$ p $\therefore q$	MT $p \supset q$ $\neg q$ $\therefore \neg p$	HS $p \supset q$ $q \supset r$ $\therefore p \supset r$	Simp $p \wedge q$ $\therefore p$	Simp $p \wedge q$ $\therefore q$	Conj p q $\therefore p \wedge q$
Dil $p \supset q$ $r \supset s$ $p \vee r$ $\therefore q \vee s$	DS $p \vee q$ $\neg q$ $\therefore p$	DS $p \vee q$ $\neg p$ $\therefore q$	Add p $\therefore p \vee q$	Add q $\therefore q \vee p$	

4. Replacement Rules

Dup $p :: (p \vee p)$ $p :: (p \cdot p)$	Comm $(p \vee q) :: (q \vee p)$	Assoc $((p \vee q) \vee r) :: (p \vee (q \vee r))$ $((p \wedge q) \wedge r) :: (p \wedge (q \wedge r))$
CE $(p \supset q) :: \neg p \vee q$	DeM $\neg(p \vee q) :: (\neg p \wedge \neg q)$ $\neg(p \wedge q) :: (\neg p \vee \neg q)$	BE $(p \equiv q) :: ((p \supset q) \wedge (q \supset p))$
DN $p :: \neg\neg p$	Contrap $(p \supset q) :: (\neg q \supset \neg p)$	Dist $(p \cdot (q \vee r)) :: ((p \wedge q) \vee (p \wedge r))$ $(p \vee (q \wedge r)) :: ((p \vee q) \wedge (p \vee r))$
		Exp $((p \wedge q) \supset r) :: (p \supset (q \supset r))$

5. Condition Proof and Indirect Proof

Conditional Proof



Indirect Proof

