

INFERENCE RULES

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Abstract

A set of inference domain axioms for propositional logic

Inference rules

Our propositional inference rules

Abbreviation	Name	If you know all of...	...then you can infer
\wedge Intro	and-introduction	ϕ	$(\phi \wedge \psi)$
ψ			
\wedge Elim	and-elimination (left)	$(\phi \wedge \psi)$	ϕ
and-elimination (right)	$(\phi \wedge \psi)$	ψ	
\vee Intro	or-introduction (left)	ϕ	$(\phi \vee \psi)$
or-introduction (right)	ψ	$(\phi \vee \psi)$	
\vee Elim	or-elimination	$\phi \vdash \theta$	θ
$\psi \vdash \theta$			
$(\phi \vee \psi)$			
\rightarrow Intro	if-introduction	$\phi, \psi, \dots, \theta \vdash \omega$	$((\phi \wedge \psi \wedge \dots \wedge \theta) \rightarrow \omega)$
\rightarrow Elim	if-elimination (modus ponens)	$(\phi \rightarrow \psi)$	ψ
ϕ			
falseIntro	false-introduction	ϕ	false
$\neg\phi$			
falseElim	false-elimination	false	ϕ
RAA	reductio ad absurdum	$\neg\phi \vdash \text{false}$	ϕ
RAA'	reductio ad absurdum (v. 2)	$\phi \vdash \text{false}$	$\neg\phi$
\neg Intro	negation-introduction	ϕ	$\neg\neg\phi$
\neg Elim	negation-elimination	$\neg\neg\phi$	ϕ
CaseElim	case-elimination (left)	$(\phi \vee \psi)$	ψ
$\neg\phi$			
case-elimination (right)	$(\phi \vee \psi)$	ϕ	
$\neg\psi$			

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As usual, ϕ , ψ , θ , ω are meta-variables standing for any WFF.

This is by no means the only possible inference system for propositional logic. We will talk about others in lecture.

ASIDE: This set of inference rules is based upon *Discrete Mathematics with a Computer* by Hall and O'Donnell (Springer, 2000) and The Beseme Project¹.

¹<http://www.cs.ou.edu/research/beseme.shtml>