

# Tableau Rules

	LHS	RHS
$\wedge$	$  \begin{array}{c}  p \wedge q \quad \circ \\    \\  p, q \quad \circ  \end{array}  $	$  \begin{array}{c}  \circ \quad p \wedge q \\  / \quad \backslash \\  \circ \quad p \quad \circ \quad q  \end{array}  $
$\vee$	$  \begin{array}{c}  p \vee q \quad \circ \\  / \quad \backslash \\  p \quad \circ \quad q \quad \circ  \end{array}  $	$  \begin{array}{c}  \circ \quad p \vee q \\    \\  \circ \quad p, q  \end{array}  $
$\rightarrow$	$  \begin{array}{c}  p \rightarrow q \quad \circ \\  / \quad \backslash \\  \circ \quad p \quad q \quad \circ  \end{array}  $	$  \begin{array}{c}  \circ \quad p \rightarrow q \\    \\  p \quad \circ \quad q  \end{array}  $
$\leftrightarrow$	$  \begin{array}{c}  p \leftrightarrow q \quad \circ \\  / \quad \backslash \\  p, q \quad \circ \quad p, q  \end{array}  $	$  \begin{array}{c}  \circ \quad p \leftrightarrow q \\  / \quad \backslash \\  p \quad \circ \quad q \quad q \quad \circ \quad p  \end{array}  $

# Predicate Logic Tableau

	LHS	RHS
$\forall$	<p>universal</p> <p><math>\forall x \phi(x)</math></p> <p><math>\phi(c_1), \dots, \phi(c_n)</math></p>	<p>existential</p> <p><math>\exists x \phi(x)</math></p> <p><math>\phi(c)</math> <math>c</math> new</p>
$\exists$	<p>existential</p> <p><math>\exists x \phi(x)</math></p> <p><math>\phi(c)</math> <math>c</math> new</p>	<p>universal</p> <p><math>\forall x \phi(x)</math></p> <p><math>\phi(c_1), \dots, \phi(c_n)</math></p>

## Precedence rules:

- (1) Logical Connectives
- (2) Existential claims
- (3) Universal claims

every time a new name is introduced  
 $\downarrow$   
 all Universal quantifiers are re-activated

## Natural Deduction

$$\rightarrow \frac{\phi, \phi \rightarrow \psi}{\psi} : E_{\rightarrow} \text{ (modus ponens)}$$

$$\frac{\begin{array}{|l} \phi \\ \vdots \\ \psi \end{array}}{\phi \rightarrow \psi} : I_{\rightarrow} \text{ (deduction)}$$

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$\neg \varphi, \varphi$

$\perp$

$\vdash E_{\neg}$

$\neg \varphi$

$\vdots$

$\vdots$

$\perp$

$\neg I_{\neg}$

$\varphi$

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