

PICTORIAL SUMMARY OF RULES OF DERIVATION

SENTENTIAL LOGIC

<p>&I</p> $\frac{\mathcal{A} \quad \mathcal{B}}{\mathcal{A} \ \& \ \mathcal{B}} \quad \frac{\mathcal{A} \quad \mathcal{B}}{\mathcal{B} \ \& \ \mathcal{A}}$	<p>&O</p> $\frac{\mathcal{A} \ \& \ \mathcal{B}}{\mathcal{A}} \quad \frac{\mathcal{A} \ \& \ \mathcal{B}}{\mathcal{B}}$	<p>~&O</p> $\frac{\sim(\mathcal{A} \ \& \ \mathcal{B})}{\mathcal{A} \rightarrow \sim \mathcal{B}}$	
<p>\veeI</p> $\frac{\mathcal{A}}{\mathcal{A} \ \vee \ \mathcal{B}} \quad \frac{\mathcal{A}}{\mathcal{B} \ \vee \ \mathcal{A}}$	<p>\veeO</p> $\frac{\mathcal{A} \ \vee \ \mathcal{B} \quad \sim \mathcal{A}}{\mathcal{B}} \quad \frac{\mathcal{A} \ \vee \ \mathcal{B} \quad \sim \mathcal{B}}{\mathcal{A}}$	<p>~\veeO</p> $\frac{\sim(\mathcal{A} \ \vee \ \mathcal{B})}{\sim \mathcal{A} \quad \sim \mathcal{B}}$	
<p>\leftrightarrowI</p> $\frac{\mathcal{A} \rightarrow \mathcal{B} \quad \mathcal{B} \rightarrow \mathcal{A}}{\mathcal{A} \leftrightarrow \mathcal{B}} \quad \frac{\mathcal{A} \rightarrow \mathcal{B} \quad \mathcal{B} \rightarrow \mathcal{A}}{\mathcal{B} \leftrightarrow \mathcal{A}}$	<p>\leftrightarrowO</p> $\frac{\mathcal{A} \leftrightarrow \mathcal{B}}{\mathcal{A} \rightarrow \mathcal{B} \quad \mathcal{B} \rightarrow \mathcal{A}}$	<p>~\leftrightarrowO</p> $\frac{\sim(\mathcal{A} \leftrightarrow \mathcal{B})}{\sim \mathcal{A} \leftrightarrow \mathcal{B}}$	
<p>DN</p> $\frac{\mathcal{A}}{\sim \sim \mathcal{A}} \quad \frac{\sim \sim \mathcal{A}}{\mathcal{A}}$	<p>\rightarrowO</p> $\frac{\mathcal{A} \rightarrow \mathcal{C} \quad \mathcal{A}}{\mathcal{C}} \quad \frac{\mathcal{A} \rightarrow \mathcal{C} \quad \sim \mathcal{C}}{\sim \mathcal{A}}$	<p>~\rightarrowO</p> $\frac{\sim(\mathcal{A} \rightarrow \mathcal{C})}{\mathcal{A} \ \& \ \sim \mathcal{C}}$	
<p>⊗I</p> $\frac{\mathcal{A} \quad \sim \mathcal{A}}{\text{⊗}}$	<p>⊗O</p> $\frac{\text{⊗}}{\mathcal{A}}$	<p>R</p> $\frac{\mathcal{A}}{\mathcal{A}}$	
<p>DD</p> <p>SHOW: \mathcal{A}</p> <div style="border-left: 1px solid black; height: 100px; margin-left: 20px;"></div> <p style="margin-left: 20px;">\mathcal{A}</p>	<p>CD</p> <p>SHOW: $\mathcal{A} \rightarrow \mathcal{C}$</p> <div style="border-left: 1px solid black; height: 100px; margin-left: 20px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black;"></div> <p style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; margin: 0; padding: 0;"> \mathcal{A} SHOW: \mathcal{C} </p> </div>	<p>ID</p> <p>SHOW: $\sim \mathcal{A}$</p> <div style="border-left: 1px solid black; height: 100px; margin-left: 20px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black;"></div> <p style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; margin: 0; padding: 0;"> \mathcal{A} SHOW: ⊗ </p> </div>	<p>ID</p> <p>SHOW: \mathcal{A}</p> <div style="border-left: 1px solid black; height: 100px; margin-left: 20px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black;"></div> <p style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; margin: 0; padding: 0;"> $\sim \mathcal{A}$ SHOW: ⊗ </p> </div>

PREDICATE LOGIC

In the following, v is any variable, a and n are names, and F is a formula. Furthermore, $F[a/v]$ is the formula that results when a is substituted for v at all its *free* occurrences in F , and similarly, $F[n/v]$ is the formula that results when n is so substituted.

$\forall\mathcal{O}$	$\frac{\forall v F}{F[a/v]}$	a can be any name
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$\exists\mathcal{I}$	$\frac{F[a/v]}{\exists v F}$	a can be any name
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$\exists\mathcal{O}$	$\frac{\exists v F}{F[n/v]}$	n must be a new name
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$\mathcal{U}\mathcal{D}$	$\begin{array}{l} \text{SHOW: } \forall v F \\ \text{SHOW: } F[n/v] \\ \hline \hline \end{array}$	n must be a new name
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$\sim\forall\mathcal{O}$	$\frac{\sim\forall v F}{F\sim\forall E}$	
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$\sim\exists\mathcal{O}$	$\frac{\sim\exists v F}{F\sim\forall A}$	
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