Logic I: Lecture 05

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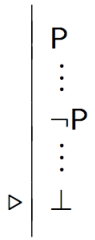
Readings refer to sections of the course textbook, *Language, Proof and Logic.*

1. ¬, ⊥

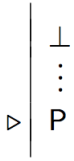
Reading: §6.3

P	¬P	⊥
T	F	F
F	T	F

⊥ Introduction
(⊥ Intro)



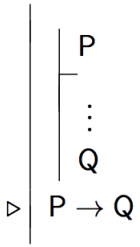
⊥ Elimination
(⊥ Elim)



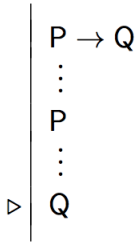
2. →Intro, →Elim

Reading: §8.1, §8.2

Conditional Introduction
(→ Intro)



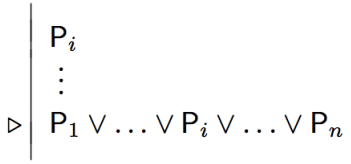
Conditional Elimination
(→ Elim)



3. →Intro: An Example

4. ∨Intro and ∨Elim

Disjunction Introduction
(∨ Intro)



Disjunction Elimination
(∨ Elim)

$P_1 \vee \ldots \vee P_n$
⋮
P_1
⋮
S
⇓
P_n
⋮
S
⋮
▷ S

5. ∨Elim and Soundness

Reading: §5.2, §6.2

6. ∨Elim: An Example

To prove a conclusion from a disjunction, prove it from each disjunct.

1. R∨S
2.
3.
4.
5.
6. S∨R

7. Not Or

Reading: §3.7

A	B	A ∨ B	¬(A ∨ B)	¬A	¬B	¬A ∨ ¬B
T	T	T	F	F	F	F
T	F	T	F	F	T	T
F	T	T	F	T	F	T
F	F	F	T	T	T	T

8. DeMorgan: ¬(A ∧ B) ⫤⊨ ¬A ∨ ¬B

Reading: §3.6, §4.2

'⫤⊨' means 'is logically equivalent to', so for now 'has the same truth table as'.

A ⫤⊨ ¬¬A

¬(A ∧ B) ⫤⊨ (¬A ∨ ¬B)

¬(A ∨ B) ⫤⊨ (¬A ∧ ¬B)

A ⟶ B ⫤⊨ ¬A ∨ B

¬(A ⟶ B) ⫤⊨ ¬(¬A ∨ B) ⫤⊨ A ∧ ¬B

9. Ambiguity

Rule 1: a NP followed by a VP is a S

Rule 2: a Vt followed by a NP is a VP

Rule 3: a NP followed by a PP is a S

Rule 4: A Vt followed by a NP then a PP is a VP

Two derivations of Groucho Marx' claim, 'I shot an elephant in my pyjamas':