Logic I: Lecture 09
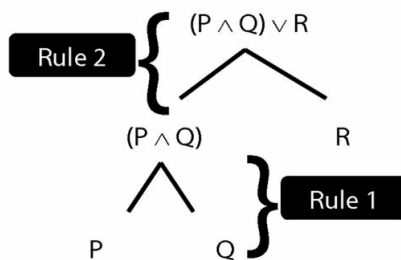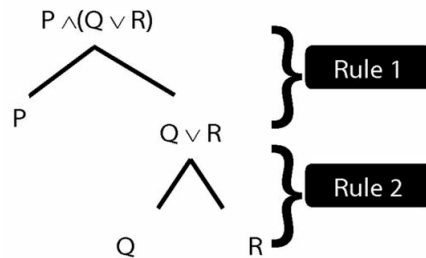
s.butterfill@warwick.ac.uk

Readings refer to sections of the course textbook, *Language, Proof and Logic.*
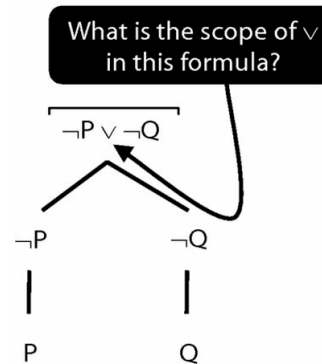
1. Recap: Scope
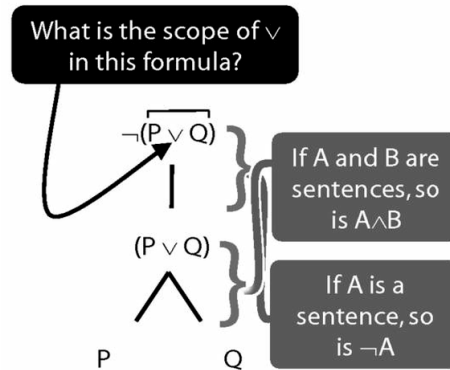
Reading: §3.5

2. Scope and Negation

Reading: §3.5, §3.6

3. I Met a Philosopher

Reading: §9.2, §9.3, §9.5

4. Translation with Quantifiers

Reading: §9.5, §9.6

All discordians weep:
$\forall x(\ \mathrm{Dscrdn}(x) \rightarrow \mathrm{Wps}(x)\ )$

All **French** discordians weep:
$\forall x(\ (\ \mathbf{Frnch(x)} \wedge \mathrm{Dscrdn}(x)\ ) \rightarrow \mathrm{Wps}(x)\ )$

All French discordians weep **and wail**:
$\forall x(\ (\ \mathrm{Frnch}(x) \wedge \mathrm{Dscrdn}(x)\ ) \rightarrow (\ \mathrm{Wps}(x)\ \wedge\ \mathbf{Wls(x)}\ )\ )$

All French discordians weep and wail **except Gillian Deleude**:
$\forall x(\ (\ \mathrm{Frnch}(x) \wedge \mathrm{Dscrdn}(x) \wedge \mathbf{\neg(x{=}a)}\ ) \rightarrow (\ \mathrm{Wps}(x) \wedge \mathrm{Wls}(x)\ )\ )$

5. Scope and Quantifiers

Reading: §9.5, §9.6

Underlining shows the scope of the quantifiers:

6. Proof Example: ¬P∨R therefore P→R

1. | ¬P∨R
2.
3.
4.
5. | P→R

7. ∀Elim

Reading: §13.1

Universal Elimination
(∀ Elim)

| ∀x S(x)
| ⋮
▷ | S(c)

2