Logic (PH133): Lecture 5

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1. Not Or

Reading: §3.7

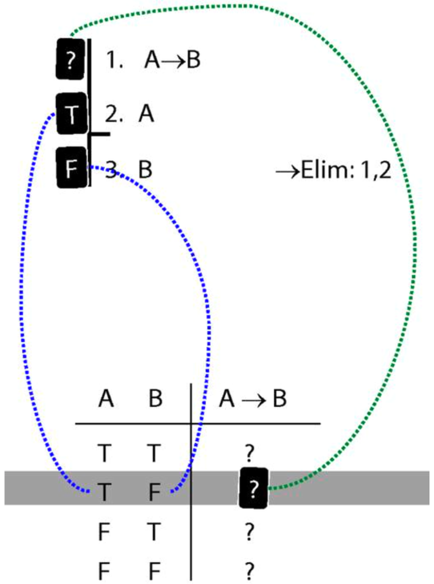
A	B	A ∨ B	¬(A ∨ B)	¬A	¬B	¬A ∨ ¬B
T	T	T	F	F	F	F
T	F	T	F	F	T	T
F	T	T	F	T	F	T
F	F	F	T	T	T	T

2. What does '⟶' mean?

Reading: §7.1

Assuming that the rules of Fitch are such that it is impossible to prove an argument which is not logically valid, the truth table for ⟶ is fixed if we accept ⟶Elim and ⟶Intro.

How do the rules of proof for ⟶ fix its truth table?



3. I Met a Philosopher

Reading: §9.2, §9.3, §9.5

4. What does ∀ mean?

Reading: §9.4

We give the meaning of ∀ by specifying what it takes for a sentence containing ∀ to be true:

1. Give every object a name.
2. For each name in turn, create a new sentence like this: delete the quantifier and replace all instances of the variable it binds with that name.
3. If ALL of the new sentences are true, so is the original sentence.

5. Vegetarians Are Evil

Reading: §9.2, §9.3, §9.5

∀x (Evil(x) → HatesMeat(x))

∀x (HatesMeat(x) → Vegetarian(x))

∀x (Vegetarian(x) → Evil(x))

6. Counterexamples with Quantifiers

	Evil(x)	HatesMeat(x)	Vegetarian(x)
Ayesha	no	no	yes

7. Not If

If she has seen it, I am dead.
$A \rightarrow B$

That's not true.
$\neg(A \rightarrow B)$

If she has seen it, I am not dead.
$A \rightarrow \neg B$

A	B	A → B	¬(A → B)	A → ¬B
T	T	T	F	F
T	F	F	T	T
F	T	T	F	T
F	F	T	F	T

8. ↔ : truth tables and rules

A	B	A ↔ B
T	T	T
T	F	F
F	T	F
F	F	T

Biconditional Elimination (↔ Elim)

$P \leftrightarrow Q$ (or $Q \leftrightarrow P$)
⋮
P
⋮
▷ Q

Biconditional Introduction (↔ Intro)

| P
| ⋮
| Q
| Q
| ⋮
| P
▷ $P \leftrightarrow Q$

9. Does 'if' mean what '⟶' means?

Reading: §7.3

These two arguments are valid: does that mean that 'if' means what '⟶' means?

$\neg A \vee B$ America does not exist ∨ Baudrillard is wrong
If A, B If America exists, Baudrillard is wrong

If A, B If you love logic, things will fall into place
$\neg(A \wedge \neg B)$ Not both: you take logic and things don't fall into

The English argument isn't valid; the FOL argument is valid; therefore 'if' can't mean what '⟶' means?

$\neg A$ Marnie will not miss her train
$A \rightarrow B$ If Marnie misses her train, she will arrive on time.