PH126 Logic I · Lecture 2

Lecturer: s.butterfill@warwick.ac.uk

Identity: two principles

If b=c then whatever is true of b is also true of c

a=a is never false

Truth tables and some truth functional connectives

Rough guide:
'∧' means and
'∨' means or
'¬' means not

P	Q	P ∧ Q	P∨Q
T	T	T	T
T	F	F	T
F	T	F	T
F	F	F	F

P	¬P
T	F
F	T

The *truth value* of a sentence is true (T) when the sentence is true and false (F) when the sentence is false.

Truth tables can be used to show that an argument is valid. For example:

	P ∨Q	// It went up the left fork or it went up the right fork
	¬P	// It didn't go up the left fork
⊢	Q	// It went up the right fork

Truth tables for this argument

P	Q	P ∨ Q	¬P	Q
T	T	T	F	T
T	F	T	F	F
F	T	T	T	T
F	F	F	T	F
		^ premise	^ premise	^ conclusion

Terminology

A *connective* joins one or more sentences to make a new sentence. E.g. 'because', '¬'

The sentences joined by a connective *constituent sentences.*

E.g. in 'P∧Q',
∧ is the connective
P, Q are the constituent sentences

Complex Truth Tables: an example

P	Q	¬(P ∧ Q)
T	T	F (T)
T	F	T (F)
F	T	T (F)
F	F	T (F)

Logical Validity

<u>Argument 3</u>

1. (P ∧ Q) ∨ R
2. ⊢ P ∨ ¬P

<u>Argument 3b</u>

1.
2. ⊢ P ∨ ¬P

<u>Argument 4</u>

1. P ∧ ¬P
2. ⊢ (P ∧ Q) ∨ R

P ∨ ¬P is a *logical truth* (see p. 568)

P ∧ ¬P is a *contradiction* (see p. 564)