

Philosophy 200

contingency, equivalence

Tautology

- A sentence of SL (or anything else) is a tautology if and only if it is true on every possible truth-value assignment of its constituents.

Tautology

P	$P \vee$	$\sim P$
T	T	F
F	T	T

Contradiction

- A sentence of SL (or anything else) is a contradiction if and only if it is false on every possible truth-value assignment of its constituents.

Contradiction

P	$P \cdot$	$\sim P$
T	F	F
F	F	T

Contingent

- A sentence of SL (or anything else) is contingent if and only if it is neither a tautology nor a contradiction.

Contingent

P	Q	$P \supset Q$
T	T	T
T	F	F
F	T	T
F	F	T

Full Truth-Tables

- Of course, one can always simply do a full truth-table and check to see if the column for the main connective is all true (for tautologies), all false (for contradictions), or a mix of the two (for contingent sentences).

Equivalence

- Equivalence: The members of a pair of sentences are logically equivalent if and only if it is not (logically) possible for one of the sentences to be true while the other sentence is false.

Equivalence (Formally):

- Sentences **P** and **Q** of SL are truth-functionally equivalent if and only if there is no truth value assignment [for the components of **P** and **Q**] on which **P** and **Q** have different truth-values.
- This means that on a full truth table, the columns for any two truth-functionally equivalent sentences of SL will be identical.

The Full Truth-Table (for illustration)

F	H	J	F &	(J ∨ H)		(F & J)	∨ H
T	T	T	T	T		T	T
T	T	F	T	T		F	T
T	F	T	T	T		T	T
T	F	F	F	F		F	F
F	T	T	F	T		F	T
F	T	F	F	T		F	T
F	F	T	F	T		F	F
F	F	F	F	F		F	F

Here are the columns for the main connectives of each claim.

The Full Truth-Table (for illustration)

F	H	J	F &	(J ∨ H)		(F & J)	∨ H
T	T	T	T	T		T	T
T	T	F	T	T		F	T
T	F	T	T	T		T	T
T	F	F	F	F		F	F
F	T	T	F	T		F	T
F	T	F	F	T		F	T
F	F	T	F	T		F	F
F	F	F	F	F		F	F

And here are the lines of the table that illustrate truth-functional differences between the claims, proving that they are not equivalent.