

Tautology, Contradiction and Contingency

Tautology :- A compound proposition which is always true, no matter what the truth value of the given propositions that occurs in it.

P	$\neg P$	$P \vee \neg P$
T	F	T
F	T	T

$P \vee \neg P$ is a Tautology

Contradiction :- A compound proposition which is always false. irrespective of the input values

P	$\neg P$	$P \wedge \neg P$
T	F	F
F	T	F

$P \wedge \neg P$ is a Contradiction

Contingency :- A compound proposition which is not a Tautology nor a contradiction. means

Some values are True and some are false

$(P \wedge (P \rightarrow q)) \rightarrow q$ is

Ⓐ Tautology Ⓑ Contradiction Ⓒ Contingency.

$\neg P$	q	$P \rightarrow q$	$P \wedge (P \rightarrow q)$	$P \wedge (P \rightarrow q) \rightarrow q$
T	T	T	T	T

p	q	$r \rightarrow q$	$\neg r \vee q$	$\neg p \rightarrow (\neg r \vee q)$
T	T	T	T	T
T	F	F	F	T
F	T	T	F	T
F	F	T	F	T

Tautology

$$\neg p \rightarrow (p \rightarrow q)$$

- Ⓐ tautology Ⓑ contradiction Ⓒ Contingency

p	q	$\neg p$	$p \rightarrow q$	$\neg p \rightarrow (p \rightarrow q)$
T	T	F	T	T
T	F	F	F	T
F	T	T	T	T
F	F	T	T	T

$$(p \wedge q) \wedge \neg(p \vee q)$$

p	q	$p \wedge q$	$p \vee q$	$\neg(p \vee q)$	$(p \wedge q) \wedge \neg(p \vee q)$
T	T	T	T	F	F
T	F	F	T	F	F
F	T	F	T	F	F
F	F	F	F	T	F

Contradiction

$$(p \rightarrow q) \vee (\neg p \rightarrow r)$$

p	q	r	$p \rightarrow q$	$\neg p$	$\neg p \rightarrow r$	$(p \rightarrow q) \vee (\neg p \rightarrow r)$
T	T	T	T	F	T	T
T	F	T	F	F	F	F
F	T	F	T	T	T	T
F	F	F	T	T	T	T

$\vee - +$

T	T	T	T ✓	F ✓	T ✓	T
T	T	F	T	F ✓	F	T ✓
T	F	T	F ✓	F ✓	T ✓	T ✓
T	F	F	F ✓	F ✓	T ✓	T ✓
F	T	T	T ✓	T ✓	T ✓	T ✓
F	T	F	T	T ✓	F ✓	T ✓
F	F	T	T	T	T	T ✓
F	F	F	T	T ✓	F	T ✓

V — +

A — X

$$(P \rightarrow q) \wedge (\neg P \rightarrow q)$$

P q	$\neg p$	$\neg p \rightarrow q$	$P \rightarrow q$	$(P \rightarrow q) \wedge (\neg P \rightarrow q)$
T T	F	T	T	T
T F	F	T	F	F
F T	T	T	T	T
F F	T	F	T	F

~~Contingency~~