

Truth tables: جدوال الصواب

Negation: النفي

P	$\neg P$
T	F
F	T

Conjunction: و

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

The conjunction $p \wedge q$ is True when both p and q are True and False other wise.

Disjunction أو

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

The Disjunction $p \vee q$ is False when both p and q are False and True other wise.

Conditional Statement: جملة الشرط

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

The Conditional Statement $p \rightarrow q$ is False when p is true and q is False are False and True other wise.

Bi conditional Statement: جملة المشروطة

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

The Bi conditional Statement $p \leftrightarrow q$ are True when p and q are True and False, but False other wise.

Exclusive or :

p	q	$p \oplus q$
T	T	F
T	F	T
F	T	T
F	F	F

- Show that $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are logically equivalent. Using truth table.

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

They are logically equivalent.

- Show that $(p \vee q) \rightarrow (p \wedge q)$ is a tautology . Using truth table.

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

It is not tautology because not all true