

Two Boolean operators: Implication/conditional, biconditional ⁽⁹⁾

- Implication (\rightarrow) and biconditional (\leftrightarrow) are useful operators that can be used for deriving new consequences from known facts
- Truth tables for \rightarrow and \leftrightarrow

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

- $p \rightarrow q$ (p implies q): if p then q, i.e.,
either p is false, or q is true

$$p \rightarrow q \equiv \neg p \vee q$$

- $p \leftrightarrow q$ (p biconditional q): p iff q, i.e.,
either both p & q true, or both p & q false

$$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$$

- Propositional laws for \rightarrow and \leftrightarrow :

① Conditional law: $p \rightarrow q \equiv \neg p \vee q$

② Biconditional law: $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$

③ Contrapositive law: $p \rightarrow q \equiv \neg q \rightarrow \neg p$.