

Logic Truth Tables Handout

1. Logical Negation (NOT):

The logical negation of a proposition or logical value is false when the proposition is true and vice versa. It can be written as "NOT p" or " $\sim p$ ".

p	$\sim p$
T	F
F	T

2. Logical Conjunction (AND):

The logical conjunction of two logical values will be true only when both values are true.

p	q	p AND q
T	T	T
T	F	F
F	T	F
F	F	F

3. Logical Disjunction (OR):

The logical disjunction of two logical values will be true when either value is true.

p	q	p OR q
T	T	T
T	F	T
F	T	T
F	F	F



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4. Logical Implication (If/Then):

The logical implication, or conditional of two logical values is also known as an if/then statement, because a logical implication is usually stated as, "If p, then q." A logical implication is only false when the antecedent (p) is true and the consequent (q) is false.

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

5. Logical Equality (If and Only If):

The logical equality, or biconditional of two logical values is also known as an if and only if statement, because a logical equality is usually stated as, "p, if and only if q." A logical equality will be true when both logical values are false or both are true.

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

6. All Truth Tables Combined:

p	q	$\sim p$	$p \text{ AND } q$	$p \text{ OR } q$	$p \rightarrow q$	$p \leftrightarrow q$
T	T	F	T	T	T	T
T	F	F	F	T	F	F
F	T	T	F	T	T	F
F	F	T	F	F	T	T