

TOPIC: EQUIVALENT STATEMENTS

Equivalent Statements

◆ **Equivalent Statements** always have the same _____. Prove 2 statements are equivalent with truth tables.

► The symbol for logical equivalence is _____ or _____.

EXAMPLE

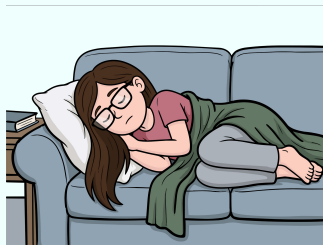
Determine if $p \rightarrow q$ and $\sim p \vee q$ are logically equivalent.

For this example, consider: p : It is the weekend. q : I sleep late.

$p \rightarrow q$: If it is the weekend, then I sleep late.

$\sim p \vee q$: It is not the weekend or I sleep late.

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



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

◆ Instead of making two truth tables, you can make 1 table for both statements.

p	q	$p \rightarrow q$	$\sim p$	$\sim p \vee q$
T	T	T	F	T
T	F	T	F	T
F	T	T	T	T
F	F	F	T	F

EXAMPLE

Use a truth table to show $\sim(p \vee q)$ & $\sim p \wedge \sim q$ are logically equivalent. Then, rewrite the statement "It is not true that the number I chose is even or below 9" in an equivalent form.

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EXAMPLE

Use a truth table to show $\sim(p \wedge q)$ & $\sim p \vee \sim q$ are logically equivalent. Then, rewrite the statement "It is not true that the number I chose is divisible by 3 and 4." in an equivalent form.

EXAMPLE

Predict if the statements are logically equivalent. Then, translate into symbols & prove with a truth table.

Statement 1: If it is raining, then I bring an umbrella.

Statement 2: If I bring an umbrella, then it is raining.

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EXAMPLE

Are $(p \wedge q) \rightarrow r$ and $p \wedge (q \rightarrow r)$ logically equivalent?

EXAMPLE

Are $p \rightarrow q$ and $\sim q \rightarrow \sim p$ logically equivalent?