

## MATH 210 Discrete Math Session 4 (Section 1.2)

Write a truth table for the statement form

$$\sim[(\sim p \vee q) \wedge p] \vee q$$

### Conditional Statements

Let  $p$  and  $q$  be statements. A sentence of the form “If  $p$  then  $q$ ” is denoted by “ $p \rightarrow q$ ”;  $p$  is called the *hypothesis* and  $q$  is called the *conclusion*. Such a sentence is called a *conditional*.

If you clean up your room, then you will get ice cream.

Under what circumstances are we justified in saying the speaker spoke falsely?

If  $x^2 = 9$  then  $x = 3$ .

If  $x = 3$  then  $x^2 = 9$ .

If  $2 = 3$  then  $5 = 5$ .

If  $2 = 3$  then  $5 = 5$ .

If  $2 = 2$  then  $5 = 5$ .

If  $2 = 2$  then  $5 = 6$ .

Truth Table for  $p \rightarrow q$

p	q	p $\rightarrow$ q

**Order of Operations:**  $\sim$  first; then  $\vee$  and  $\wedge$ ; finally  $\rightarrow$

Truth table for  $(p \rightarrow q) \wedge p \rightarrow q$

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

Justify the claim that  $p \rightarrow q \equiv \sim p \vee q$ .

Justify the claim that  $\sim(p \rightarrow q) \equiv p \wedge \sim q$ .

Write truth tables for  $q \rightarrow p$ ,  $\sim p \rightarrow \sim q$ , and  $\sim p \rightarrow q$ .

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