

And, Or, Not

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## And, Or, and Not

Let  $P$  and  $Q$  be statements.

$P$  **and**  $Q$  is a new statement that is True if **both**  $P$  and  $Q$  are True; and false otherwise.

$P$  **or**  $Q$  is a new statement that is True if **either**  $P$  or  $Q$ , or **both**, are True; and false otherwise.

**Not**  $P$  is a new statement that is True if  $P$  is False, and False if  $P$  is  $Q$ .

And

$P$  and  $Q$  can be written  $P \wedge Q$  (compare with set intersection).

OR

$P$  or  $Q$  can be written  $P \vee Q$  (compare with set union)

# Not

Not  $P$  can be written  $\sim P$ , or sometimes  $\neg P$ .

## Examples

Write the open sentences  $x \neq y$  and  $y \geq x$  as  $P$  and  $Q$ ,  $P$  or  $Q$ , or not  $P$ .

## Example

Express the following in the form  $P \wedge Q$ ,  $P \vee Q$  or  $\sim P$ .

$$A \in \{X \in \mathcal{P}(\mathbb{N}) : |\overline{X}| < \infty\}$$



# Truth Tables

Truth tables are an effective way to keep track of combinations of statements.