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- **Disjunction**  $\vee$  “ ”  
 $p \vee q$
- **Implication**  $\rightarrow$  “... ” “ ”  
 $p \rightarrow q$
- **Biconditional**  $\leftrightarrow$  “ ”  
 $p \leftrightarrow q$

$p$	$q$	$p \wedge q$	$p \vee q$	$p \oplus q$	$p \rightarrow q$
T	F	F	T	T	F
F	T	F	T	T	T
T	T	T	T	F	T
F	F	F	F	F	T

1.1.4 “Vandana has 32gb RAM” “Vandana's PC has Linux”

$p \wedge q$ : Vandana has 32gb RAM and Vandana's PC has Linux

1.1.5 “Vandana has 32gb RAM or Vandana's PC has Linux”  
 $p \vee q$

$p \oplus q$

$p \vee q$

4 XOR  $p \oplus q$

1.1.5  $p \oplus q$  “Vandana has 32gb RAM or Vandana's PC has Linux”  
exclusive or

$p \oplus q$

“Vandana has 32gb RAM or Vandana's PC has Linux”







????????????

“????????90%????A”

????????A????????90%????A  
????????90%????“q only if p”??p?q  
????????“only”????

?p?q????p?q????“q?p”??“?p?q”??“q?p  
????”????q????p????q????p????q  
????????“p?q”??“?p?q”??“p?q”????p????q  
????p????q???

q ?? ¬p ??? ppppp

??“ q??\$ \neg p\$” pppp ???????“?p?q ”??????“ q  
??¬p ”????¬p????q????p??q????“ q??\$ \neg p\$ ”  
?????, “ q??\$ \neg p\$ ”?p?q????

? 1.1.7 p“Maria”q“Maria”pp→q

? \$p \to q\$ ?? ?p ? q? ??????“??Maria????????”

??“??...??...”?????“?”????p??“?”????q  
????p ? q????p????q????q????p  
????

????????

“????????”

“????????”,

“????????”

“??Maria????????”

????????



1.1.8  $2 + 2 = 4$   $x := x + 1$   $x = 0$

$2 + 2 = 4$  true  $x := x + 1 = 0 + 1 = 1$

$p \rightarrow q$

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

1.3

$p \rightarrow q$   $\neg p \rightarrow \neg q$   $\neg p \rightarrow \neg q$   $\neg q \rightarrow \neg p$   $p \rightarrow q$

1.1.8  $(p \rightarrow q) \rightarrow (p \rightarrow q)$

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

- 

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

- 

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

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

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“ $p \rightarrow q$   $\Leftrightarrow p \rightarrow q$ ”  $p \rightarrow q$   
 $p \rightarrow q$   $\Leftrightarrow p \rightarrow q$   
 $p \rightarrow q$

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

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

6 p q p q p q p q

“ ”

p q

- “p q”
- “p q” “p q” “p q”
- “p q” “iff” “if and only if” p q
- “p q” “p q” p q
- “p q” “iff” “iff” p q p q

1.1.9 p “ ” q “ ” p q

“ ”

p q

“ ”

p q

“ ”

“ ”

biconditionals “ ”

“ ” if and only if “ ” if, then

“ ” only if “ ”

“ ”

- “ ”

“ ”

“ ”

“ ”

p q p q

1.1.4

