(and) ∧ of ∪ &

π is bigger 3 and π Less than 3.2

π > 3 ∧ π < 3.2 to illustate

3. < π < 3.2

φ, ψ —— for φ, ψ : φ ∧ ψ means they Both true
                                    in
                                    Conjunction

φ and φ, ψ are called Conjucts

φ, ψ relundwelly true, then: φ ∧ ψ are true

  ∬ φ ∧ ψ

φ → called "phi"

ψ called "si"

φ, ψ

φ ∧ ψ means same as —— Conjucts ψ ∧ φ   ψ ∧ φ same φ ∧ ψ

Conjuction is Commutative ? ← independent of arde

' in normal Englishi and is Not Commutative.
  × — φ picked up glass and it fell out off my hand
  × — it fell out off my hand and φ picked up glass

Proposational Truth table

ϕ	ψ	$\phi \wedge \psi$
T	T	T
T	F	F
F	T	F
F	F	F

$\wedge$ and

$\vee$ (or)

OR

$a > 0$ or the equation $x^2 + a = 0$ has real root (Exclusive)

$ab = 0$ if $a = 0$ or $b = 0$ (inclusive) ②

in math, "OR" means inclusive ②

useg $\vee$ Symbol (disjunction

ϕ, ψ : $\phi \vee \psi$, ϕ or ψ or both.

ϕ, ψ are called disjuncts, with
at least one can be true

$(3 < 5)$ or $\vee$ $(1 = 0)$ (true)

↖ of Even though this one is false

ϕ	ψ	$\phi \vee \psi$
T	T	T
T	F	T
F	T	T
F	F	F

(3)

not $\phi \psi$, not ψ $\neg \psi$ or $\sim \psi$

$$\neg (x = y) \quad \text{or} \quad \neg (a < x < b) \checkmark \text{ Better}$$

and not not $(x \neq y)$ or $\quad (a \not< x \not< b) \Leftarrow$ avoid

$\neg (\pi < 3)$, means $\pi \geq 3$. (Easy)

"(all) (foreign) (cars) are (badly) (made)"

$\Rightarrow$ How negate?

(a) all foreign cars are well made $\leftarrow$
(b) all local cars are badly made
(c) one foreign car are well made

? (c) at least one foreign car is well made
? (d) at least one foreign car is not badly made

two possibilities

Truth table

ϕ	$\neg \phi$
T	F
F	T

answer is dependent on our knowledge of everyday world
$\Rightarrow$ in maths this is not the case!