

Are These Propositions?

$$2 + 2 = 5$$

$$x + 2 = 5$$

Akjsdf!

Who are you?

There is life on Mars.

Proposition

A statement that has a truth value (i.e. is true or false) and is “well-formed”

Some Truth Tables

p	$\neg p$
T	F
F	T

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

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

Truth tables are the simplest way to describe how logical connectives operate.

Implication ($p \rightarrow q$)

"If it's raining, then I have my umbrella"

*It's useful to think of implications as promises. An implication is false exactly when you can **demonstrate** I'm lying.*

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

	It's raining	It's not raining
I have my umbrella	No lie. True	No lie. True
I do not have my umbrella	LIE! False	No lie. True

$p \rightarrow q$

Implication:

p implies q

whenever p is true q must be true

if p then q

q if p

p is sufficient for q

p only if q

q is necessary for p

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

Implications are super useful, so there are LOTS of translations.
You'll learn these in detail in section.