Aug 20, 2018

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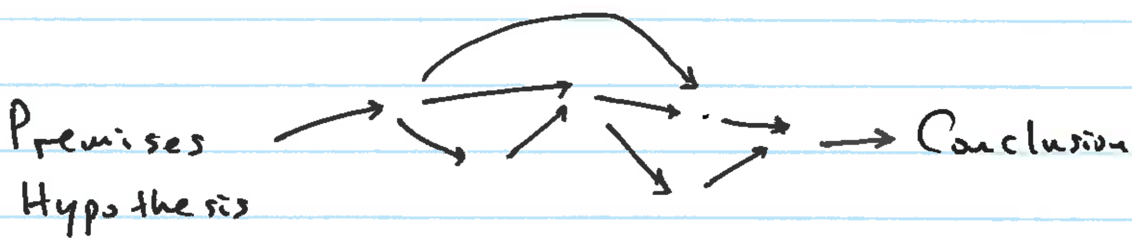
What is a proof?

It is a way of convincing everyone that a statement is true, if started from certain premises.



In English, or any language as long as statements are precise & complete.

- You can't convice anyone if
  - you don't believe it
  - you don't agree with it
  - you don't understand it.

1.1

Statement : Declarative sentence, that can be classified as true or false

Ex $3+5=8$ statement ✓

Ex. $x^2=4$ not a statement without a context

(True) There are real numbers x such that $x^2 = 4$.

statements

For every natural number x, $x^2 = 4$.

(False)

(since if we take $x = 3$, 3 is a natural #, and $3^2 = 9 \neq 4$.)

Ex "This statement is false."

"Self contradictory"

So it is not a statement, due to the fact that it cannot be classified as true or false.

Given statements, we can

unary
- negate a statement (use $\sim$)

binary
- use sentennial connectives to combine statements.

or	$\vee$	conjunction
and	$\wedge$	disjunction
implies	$\Longrightarrow$	implication / conditional

- Mathematical "or" is inclusive

(English : and/or) = (mathematical or)

- $p \Rightarrow q$

Hypothesis — consequent

antecedent — conclusion.

$p \Rightarrow q$ $\begin{cases} \text{If } p \text{ then } q. \\ p \text{ implies } q \\ q \text{ if } p \\ p \text{ only if } q. \end{cases}$

Truth Tables

T : True

F : false

"$\sim$" means not

		and	or	implies		
p	q	$p \wedge q$	$p \vee q$	$p \Rightarrow q$	$\sim p \vee q$	$p \wedge \sim q$.
T	T	T	T	T	T	F
T	F	F	T	F	F	T
F	T	F	T	T	T	F
F	F	F	F	T	T	F

same — opposite