Introduction

Proof



Proof is method of obtaining / ascertaining a truth.

Example

- L. Experimentation
- 2. Observation
- 3. Sampling & Counter examples
- 1. Judge & Juries
- 5. Religion (Word of God)
- 5. Word of Boss

Important

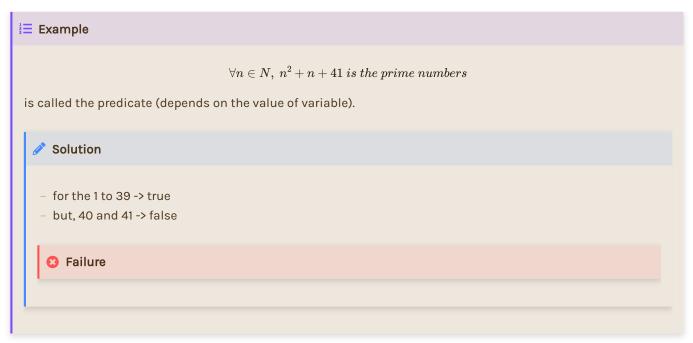
In mathematics, a mathematical proof is a verification of a **proposition** by a chain of **logical deductions** from a set of **axioms**.

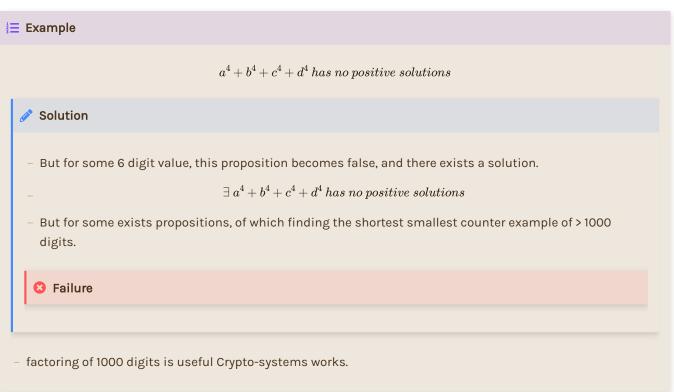
Proposition



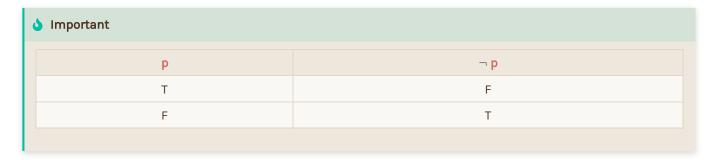
A proposition is statement which is either true or false.

For this proposition to be to, the predicate has to come true.

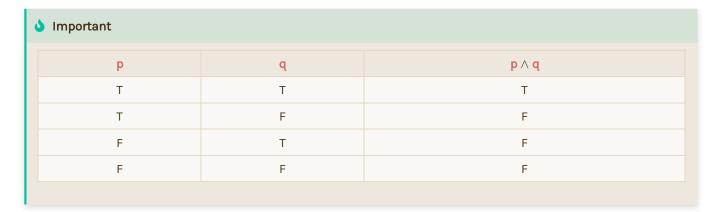




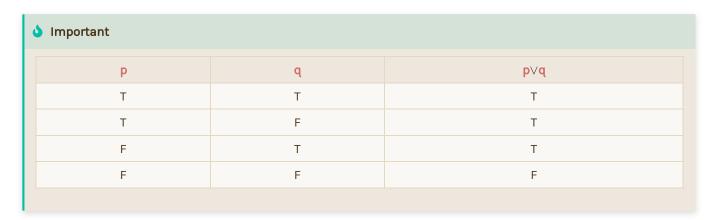
Not



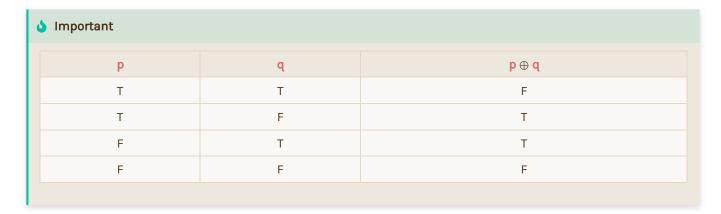
And



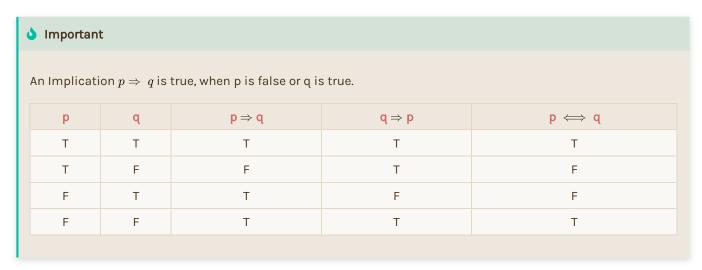
Or



Exclusive Or (xor)



Implies





"If pigs fly, I would be king" is true.

if and only if (iff)

•	Important

- either both true or both false

р	q	$p \Longleftrightarrow q$
Т	Т	Т
Т	F	F
F	Т	F
F	F	Т

Example

$$|x^2 - 4 \ge 0 \iff |x| \ge 2$$

Conjecture



Conjecture is an opinion or conclusion formed on the basis of incomplete information.

Axiom



An axiom is a proposition that is assumed to be true.

Example

- In Euclidean Geometry, Given a line L and a point P not on line L, there is exactly one line through P || L.
- In Euclidean Geometry, Given a line L and a point P not on line L, there is no line through P || L.
- In Hyperbolic Geometry, Given a line L and a point P not on line L, there is infinite lines through P \parallel L.

Attention

- Axioms should be consistent and complete
- A set of Axioms is said to be consistent if no proposition can be proved to be both true and false.
- A set of Axioms are said to be complete if it can be used to prove every proposition is either true or false.

Notations

- ∀ (for all)
- ∃ (ther exists)
- $-\in$ (belongs to)