Preliminary

Element vs. Set

$a \in A$

a is in A.

Element vs. Set

$$a \in A$$

"a is an element of A."

"a belongs to A."

Set vs. Set

$$A \subset B$$

"A is a subset of B."

"A is included in B."

$\forall$ For All

For Any

$\exists$ There Exists …

$\exists!$ There Uniquely Exists…

$$\forall\, x \in R,$$

$$\exists!\; y \in R \;\text{ s.t. }\; y = x^2$$

Logic and Reasoning

If a is an apple,

then a is a fruit.

If a is a fruit,

then a is an apple.

If a is not an apple,

then a is not a fruit.

If a is not a fruit,

then a is not an apple.

If P, then Q. Statement

If Q, then P. Converse

If ~P, then ~Q. Inverse

If ~Q, then ~P. Contrapositive

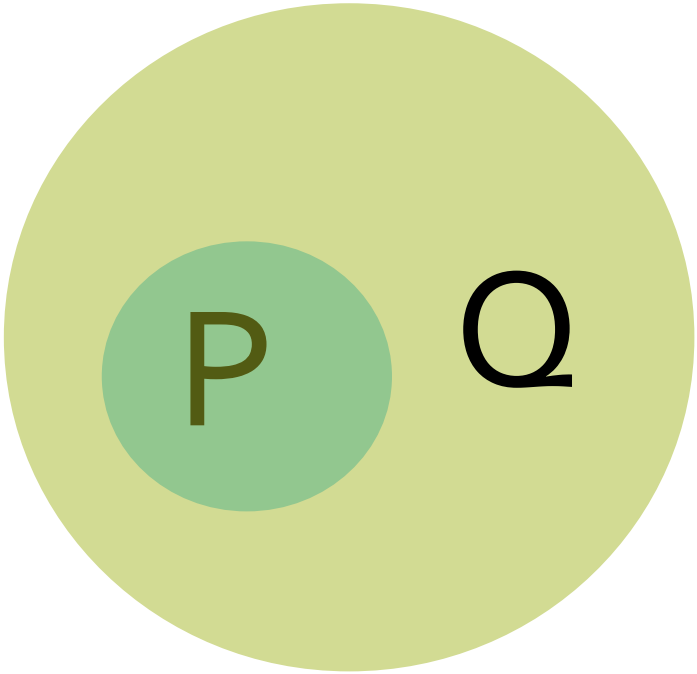
If P, then Q. i.e., $P \longrightarrow Q$

True

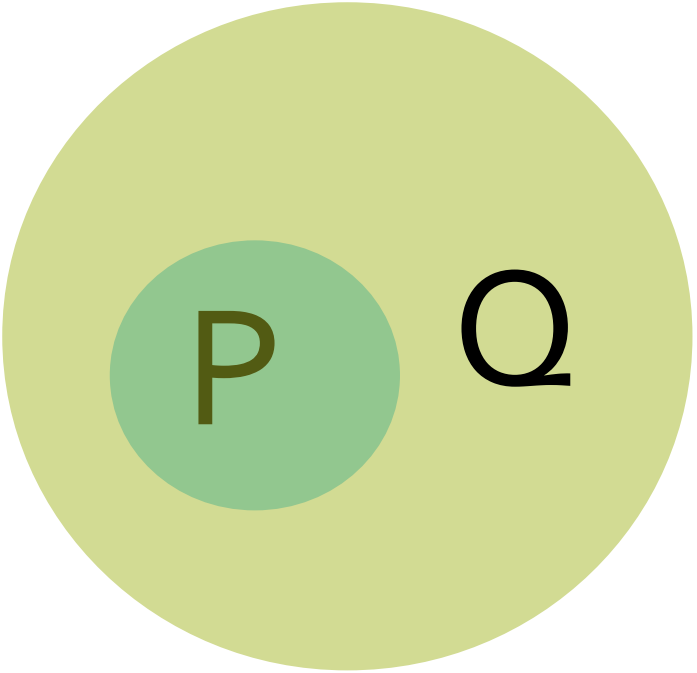
$P \Longrightarrow Q$

"P implies Q."

$$P \Longrightarrow Q$$

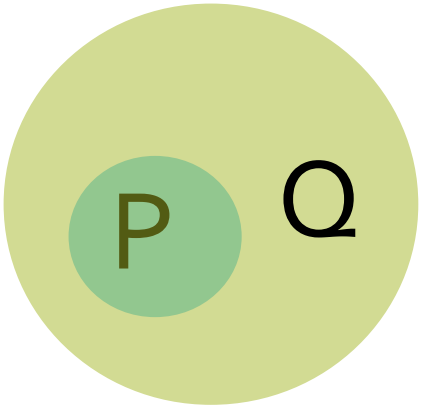


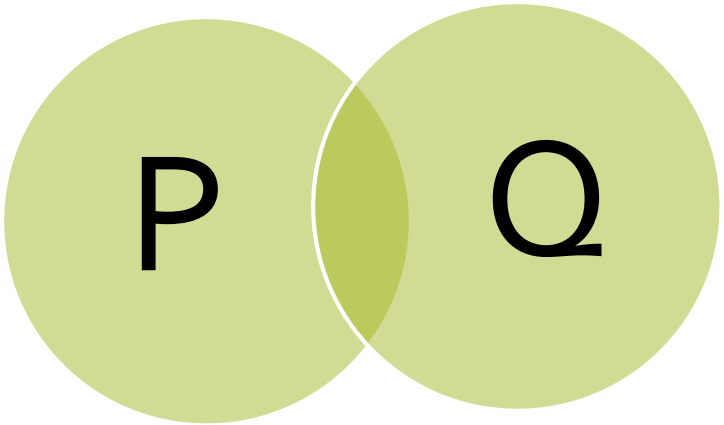
$P \Longrightarrow Q$



$Q \not\Rightarrow P$

$Q \not\Rightarrow P$





Q does not imply P.

Statement $\Leftrightarrow$ Contrapositive

$P \rightarrow Q \quad \Leftrightarrow \quad \sim Q \rightarrow \sim P$

If a is an apple,

then a is a fruit.

If a is not a fruit,

then a is not an apple.

Apple Basket

Fruit Basket