

Conditional statements

* Conditions

- if p then q $p \rightarrow q$

- p is hypothesis

- q is conclusion

- if first part is false, and second part, then it was a lie

- $F \rightarrow T$, not a lie

- $T \rightarrow F$, lie

- $F \rightarrow F$, true

- $F \rightarrow T$, true

- $T \rightarrow T$, true

- $T \rightarrow F$, false

* Converse

- converse of $p \rightarrow q$ is $q \rightarrow p$

* Inverse

- $p \rightarrow q$, inverse is $\sim p \rightarrow \sim q$

* Contrapositive

- $p \rightarrow q = \sim q \rightarrow \sim p$

- same as $p \rightarrow q$

* Equivalence

- $p \leftrightarrow q$, p if and only if q

- $p \rightarrow q$ $q \rightarrow p$

F	F	T
F	T	F
T	F	F
T	T	T

- $p, \text{ if } q = q \rightarrow p$
- $p, \text{ only if } q = p \rightarrow q$
- p is necessary & sufficient for q
- p is suff. for $q = p \rightarrow q = p \text{ only if } q = q, \text{ if } p$
- p is nec. for $q = q \rightarrow p = p, \text{ if } q$

* Tautology

- $p \vee \neg p = \text{always true}$
- $p \rightarrow q \leftrightarrow \neg q \rightarrow \neg p$

* Contradiction

- false for all values
- $p \wedge \neg p$

* Commutative Properties

- not true for implying
- Associative

- can be

* Distributive

- can do, but flip signs