1.7. Converse, Inverse, & Contrapositive

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original $(p \to q)$

With any Conditional Statement. There are 3 related Statements

Converse: formed by switching the order of p & q. $(q \to p)$

Inverse: formed by negating both p & q. (opposite) $(\sim p \to \sim q)$

Contrapositive: formed by negating both p & q and switching the order. $(\sim q \to \sim p)$

ex) Original Statement:

"If Mr. G. teaches Science, Then Mr. G is a teacher."

Converse: "If Mr. G. is a teacher, Then Mr. G. teaches Science."

Inverse: "If Mr. G. does Not teach Science, Then Mr. G. is not a teacher."

Contrapositive: If Mr. G. is Not a teacher, Then Mr. G. does Not teach Science."

Truth Value: Does the Converse, Inverse, & Contrapositive of a statement, have the original Truth Value of that original Statement.?

Consider the Prev. Example.

*Original: $F \rightarrow T = T$

Converse: $T \rightarrow F = F$

Inverse: $\sim F \rightarrow \sim T = T \rightarrow F = F$

*Contrapositive: $\sim T \rightarrow \sim F = F \rightarrow T = T$

Rule to Know:

- Original & Contrapositive Always have the Same Truth Value.
- Converse & Inverse could have the same Truth Value of the Original, but NOT Always

Helpful Chart

Conditional	Relation to original	Truth Value compared to original
$p \Rightarrow q$	original	T or F
$q \rightarrow p$	Converse	Converse of True Conditional may be T or F
$\sim p \rightarrow \sim q$	Inverse	Inverse of True Conditional may be T or F
$\sim q \rightarrow \sim p$	Contrapositive	Always the same Truth Value as the original

O.T.L.

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