# 2.2 Conditional statements

**Conditional statement**: a statement that can be written in the form $p \to q$; "if p, then q"

The hypothesis, p, is the part of the statement following "if".

The conclusion, q, is the part of the statement following "then".

Ex: State the hypothesis & conclusion of:

If today is Oct. 4, then tomorrow is Oct. 5.

p: today is Oct. 4

q: tomorrow is Oct. 5

A number is even if it is divisible by 2.

p: it is divisible by 2

q: a number is even

A conditional statement has a truth value of true or false.

Ex: Determine the truth value & if false, find a counterexample.

If today is Monday, tomorrow is Tuesday. T

If you have a pet, then it is a dog. F, it may be a rat

If odd numbers end with a 2, then today is Friday. True

* If the hypothesis is false, the statement is always true.

# Related Conditionals

1. negation, $\sim p$, not $p$
2. converse, exchange the $p$ & $q$, $q \Rightarrow p$.
3. inverse, negating both $p$ & $q$, $\sim p \Rightarrow \sim q$
4. contraposition: negating & conversing $p$ & $q$

$\sim q \Rightarrow \sim p$

Ex: If today is Monday then tomorrow is Tuesday.

If tomorrow is not Tuesday, then today is not Monday.

Ex: Find the truth value of all related conditionals to:

A number is divisible by 2 if it is even.

converse: If a number is divisible by 2, then it is even. T

inverse: If a number is not even, then it is not divisible by 2. T

contrapositive: If a number is not divisible by 2, then it is not even. T