

Today's Plan

Upcoming:

- Assignment Quiz #1 Friday!

Last time:

- Finished combinations with repetition

Today's topics:

- 2.1: Basic Connectives and Truth Tables
- Start on 2.2: Logical Equivalence: The Laws of Logic

Section 2.1: Basic Connectives & Truth Tables

A compound statement is called a *tautology* (T_0) if it is true for all truth value assignments for its component statements.

If a compound statement is false for all such assignments, then it is called a *contradiction* (F_0).

E.g. $p \rightarrow (p \vee q)$

Example

Consider the following: $p \wedge (\neg p \wedge q)$

Arguments

Consider an argument that contains the premises p_1, p_2, \dots, p_n and a conclusion q

If any one of p_1, p_2, \dots, p_n is false, then no matter what truth value q has, the implication is true.

Section 2.2: Logical Equivalence

Consider the following: $s_1 : \neg p \vee q$ $s_2 : p \rightarrow q$

p	q			

Logical Equivalence

$$p \rightarrow q$$

$$p \leftrightarrow q$$

$$p \oplus q$$

Logical Equivalence

If s_1 and s_2 are statements and $s_1 \leftrightarrow s_2$ is a tautology, then s_1 , s_2 must have the same corresponding truth values and $s_1 \Leftrightarrow s_2$.

Similarly, when s_1 and s_2 are logically equivalent statements (I.e. $s_1 \Leftrightarrow s_2$) then the compound statement $s_1 \leftrightarrow s_2$ is a tautology.