Date: 2013-01-30
Title: Jan 30 Notes Published: true
Type: post
Excerpt: Notes on Section 1.1

Jan 30

Some examples on page 4 -

Section 1.1 - Logic

- Logic started as a model for **reasoning**.
- Logic viewed as a **foundation** of mathematics.
- Used as a method of **precise specification**.

In computer science

- A language based entirely of logic, called **prolog**.
- There are two kinds of logic
- Propositional Logic
- Predicate Logic

Propositional Lgoic

- 1 + 1 = 2
- 2 +3 = 5

Non propsitional logic

- Questions, obscure statements, paradoxes

Paradox Example:

> This statement is wrong

Ground Propostions

- P&Q = P ∧ Q the ∧ is an "AND"
- P || Q = P V Q the V is an "OR"
- P ⊕ Q = Exclusive Or
  - The exclusive or means one or the other only
- P → Q = Implies.
  - The first argument is the **proposition** and the second argument is the **consequence**.
- P ⇔ Q = If and Only If
- Use truth table, see page 4
- How many connectors could there be?
  - A counting principle
  - Let there be 3 boxes, with V values (IE: 4 values)
  - The answer would be

$$4^3$$

  - With a formula of

$$v^b$$

  - For example, with 2 arguments and 4 connectors, there is 2^4 or 16 total

Implies example:

> If you study well you will get an A

Examples for implies wording

```
*   If P then Q
*   Q if P
*   P is sufficient for Q
*   Q whenever P
```

Compound Propositions

- Look similar to (2+3)*5

Example:

> (P&Q)||R

- See page 4

Translating English to Logic

> If I go home or I go to my office I will not go shopping

- Must translate and underline important words.
- For example:

> **If** *I go home* **or** *I go to my office I will* ***not*** *go shopping*

- I go home becomes s1
- I go to my office is s2
- I will not go is s3
- So, we get (s1 || s2) → !s3, and a truth-table is used to evaluate it
- What if two statements are equivalent?
- F1 and F2, F1 is equivalent to F2 and is denoted by F1 ≡ F2 (triple line equals).
- **Equivalence** - F1 and F2 have the same truth table
- **Tautology** - something which is always true

Tautology Example

> p || !p

Contradiction Example

> p & !p

DeMorgan's

- One of most famous examples, makes sense by a truth table.[1]

1. Notebook page 5↩