Lecture Outline

Before this lecture, you must know:

- Basic understanding of **OR, AND, NOT** operators

After this lecture, you will know:

- What is propositional logic
- How to define a proposition
- How to use propositional connectives
- How to draw a truth table
- Understand definition of Validity, Equivalence, Satisfiability, Entailment

Introduction

What is propostional logic?

- The simplest, and most abstract logic we can study is called propositional logic
- Use Formal Language to re-define a process

Why Formal Languages not Natural Language?

- Natural languages are the languages people speak, such as English, Spanish, and French.
- They were not designed by people (although people try to impose some order on them); they evolved naturally.
- Formal languages are languages that are designed by people for specific applications.
- For example, the notation that mathematicians use is a formal language that is particularly good at denoting relationships among numbers and symbols. Chemists use a formal language to represent the chemical structure of molecules. And most importantly:

Cons of natural language:

- Natural languages are **ambiguous**
- For example: “The table won’t fit through the doorway because it is too wide”
  - But we don’t know how wide it is
- Ambiguity makes it difficult to interpret meaning of phrases/sentences
- But also makes inference harder to define and compute

More examples of formal language (use propositional logic):

- Verification of large-scale VLSI
- Software verification (e.g. SeL4)

Quiz Time!