COMP102P

Language and Logic

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Notes compiled by Matt Bell and others

Chapter 1

Propositional Logic

Propositional logic is reasonably straight forwards. You make a bunch of assertions and test if they are true or not. Let's check out the syntax whilst trying to keep it nice and simple.

1.1 Syntax

An element or assertion in logic (e.g., "it is sunny today", "I slept through my lecture") is called a *proposition*. They're normally given single letters like p or q (p for proposition, right?), but as with all things maths, definitions change when the author feels like it.

If you have the proposition on its own, it's known as an *atomic formula*. However, you can connect more than one proposition together using a *binary connective*, which are a way of creating a new proposition from two propositions (there's also a unary connective, which is the not connective, or the negator ($\neg$)). Here, let's try this out, shamelessly ~~stolen~~ borrowed from Hirsch's notes.

- p
- $(p \vee q)$
- $\neg(p \wedge q)$
- $(\neg p \to (\neg q \vee r))$

Glossary

atomic formula A formula consisting of a single proposition. 1

binary connective Also known as a binary operator in CS, a way of linking two propositions. 1

proposition An assertion or statement in propositional logic. 1

semantics The meaning of a formula. 1