Dependent Types and Theorem Proving: Proving is programming in disguise

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March 2021

Plan of lectures

- Lecture 1: Programming with dependent types.
- **Lecture 2: Proving theorems with dependent types.**
- Lecture 3: Differences between programming and proving.
- Lecture 4: Examples of bigger programs and longer proofs.
- Lecture 5: A deeper dive into F*.

The booleans and their logic

- Being a programmer, you are good friends with the booleans, aren't you?
- There are two booleans, `true` and `false`.
- We can combine booleans `b` and `c` with the usual boolean functions:
- `not b` – negation, pronounced "not b"
- `b && c` – conjunction, pronounced "b and c"
- `b || c` – disjunction, pronounced "b or c"
- We can also define less commonly used boolean functions:
- `b ==> c = not b || c` – implication, pronounced "if b then c"
- `b <=> c = b ==> c && c ==> b` – logical equivalence, pronounced "b if and only if c"

Classical logic