

# Dependent Types and Theorem Proving: Proving is programming in disguise

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## 1 Constructive propositional logic: you already know it

- Propositional logic
- Propositions are types, proofs are programs
  - Function types are implications
  - Sum is disjunction
  - Product is conjunction
  - Unit is True
  - Falsity and negation

## 2 First-order logic: you already know it

- Predicates and relations
- Universal quantifier is the dependent function type
- Existential quantifier is the dependent pair type

## 3 Induction is recursion

## 4 Inductive predicates and relations

- Undecidability and generative thinking
- Proof relevance

## 5 Equality

- Definition and convertibility
- Properties of equality
- Constructive equality of functions and types

