

Dependent Types and Theorem Proving: Proving is programming in disguise

Wojciech Kołowski

March 2021

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 Higher-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
- Coinductiveness of functions and types

