Software Foundations
List and Poly

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Important topics
covered in Ch01-Ch03

- Case distinction

  `and_true_elim1`, `and_true_elim2`
- Induction

  `plus_0_r`, `minus_diag`, `plus_comm`,...
- Informal proofs

  `plus_comm_informal`
- Lists
- Polymorphism
  - (like Java Generics)
  - can be implicit (see `length`'')

General Induction Hypothesis

`intros`

- removes `forall`
- moves variable to hypothesis (“above the bar”)
- sets variables to an **fixed but arbitrary** value

`induction`

- only works for hypothesis
- creates IH as general as the current goal
- thus the need to be careful with `intros`
- ... or use `generalize dependent` (Ch04) **before** `induction`

Tactics!

`apply`

- "use" a theorem, hypothesis, constructor
- replace **matching conclusion** with assumptions
- difference to `rewrite`?
  - can actually **solve** a goal (`rewrite` e.g. needs `reflexivity`)
  - has to match **entire** goal (`rewrite`, `replace` can also act on parts)
- `apply H with ...`
  - explicitly instantiate `forall`'d variables in `H`
  - `trans_eq_example`

Tactics!
`inversion`

- extracts information from equality-hypothesis (`sillyex1`)
- removes invalid cases (`silly6`)
- more to come. . .

Tactics!

- `unfold`
- `remember`
  see `override_same`
- `symmetry`
- ... see end of Ch03!

Subversion

Solution Repo

https://proglang.informatik.uni-freiburg.de/svn/foundation2012d

Individual Repos

- For personal use, submissions and discussions.
- See your email

Access

- TF username
- www-password:

  https://support.informatik.uni-freiburg.de/cgi/support/fawmgr.cgi?wpassword:en

  - needs to be resetted/renewed

Preview Ch05

- Define properties other than equality
- Introduces interesting concepts
  - difference proofs/proof scripts
  - more about `inversion`
  - more about `induction`
- Exercises
  - a few short ones are `(* EXPECTED *)`
  - do more, when you are unsure
  - one longer `(* EXPECTED *)` at the end
- Optional material at the end

  Interesting, but a bit difficult