



Assignment 6 Semantics, WS 2009/10

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www.ps.uni-sb.de/courses/sem-ws09/

Hand in by 11.59am, Tuesday, December 1

In this assignment you will prove facts about three equivalent reflexive transitive closure operators. We have prepared a Coq file that contains the necessary definitions and the statements of the theorems. The file also contains some proofs. Make sure that you understand the proofs and the results they establish.

Send your solutions in a file named `lastname.v` to doczkal@ps.uni-sb.de. Make sure that the entire file compiles without errors.

Exercise 6.1 (Deriving inversion) Prove the following in Coq. Do *not* use inversion. Follow the proof of *nso* that is given in the file.

- a) $true \neq false$.
- b) S is injective.

Exercise 6.2 (Reflexive transitive closure) In the file you find three reflexive transitive closure operators, *stard*, *stari*, and *starn*. Prove the following:

stari_T: *stari* r is transitive

i2n: $stari\ r \subseteq starn\ r$

d2i: $stard\ r \subseteq stari\ r$

i2d: $stari\ r \subseteq stard\ r$

stard_R: *stard* r is reflexive

stard_LT: *stard* r is left transitive with respect to r

stard_wind: $reflexive\ p \rightarrow left_trans\ r\ p \rightarrow stard\ r \subseteq p$

stard_T: *stard* r is transitive

Use *stard_ind* for the proof of *stard_T*, but not *stari* and *starn* or other results that depend on them.