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Semantics of Programming Languages

Exercise Sheet 11

Exercise 11.1 Hoare Logic for Nondeterminism and Assertions

Use the template file `Ex11_Template.thy`.

We consider a language extension with

- finite nondeterminism via the *OR* command, as seen in Homework 6,
- infinite nondeterminism via an unknown assignment $v ::= ?$ which sets a variable to an arbitrary value, and
- assertions, via command *ASSERT* b with a Boolean expression b.

The language definition and its big-step semantics are already given. Formulate Hoare rules for the new constructs and extend the soundness and completeness proofs.

Exercise 11.2 Strongest Postconditions

Define a function *sp* (analogous to *wp*) that computes the strongest postcondition after execution of a command.

State and prove a rule of the form $sp\ (x ::= a)\ P = ...$