Formal Semantics of Programming Languages
Exercise 4 (June 24)

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The exercise is to be submitted by the denoted deadlines as a report with a decent cover page (title of the course, your name, Matrikelnummer, email address) in one of the tollowing forms:

1. either as a single PDF file uploaded in Moodle (no emails, please), or

2. as a stapled paper report handed out to me (in class or in my mailbox).

Exercise 4: Languages with Contexts

1. Augment the language of Figure 7.2 to include procedures and procedure invocations:

   $D ::= \dots \mid \textbf{proc } I = C.$
   $C ::= \dots \mid \textbf{call } I.$

   Give the semantic equations for these constructs under each of the following assumptions:

   a) The domain *Denotable-value* is augmented with the summand

   $$Proc = Store \rightarrow Poststore_\perp$$

   to accomodate procedures.

   b) The domain *Denotable-value* is augmented with the summand

   $$Proc = Environment \rightarrow Store \rightarrow Poststore_\perp$$

   to accomodate procedures.

   What kind of scoping is used in each case?

2. Integrate the domain of one-dimensional arrays *1DArray* into the language of Figure 7.2. Define operations for the construction of an array (allocation of an array of certain bounds initalized in all positions with a user-defined value) and for the usual indexed read/write access to its elements.