

Exercise 1

We are interested in the semantics with static links for variables and procedures. We extend the **While** language with blocks and procedures with a write command: *write x* prints out the value of $sto \circ env_V(x)$, but variable environment and storage function are left unchanged.

We consider the following program:

```
begin var x := 2;
      begin var y := 7;
            begin var x := 5;
                  var y := 0;
                  call p;
            end
      end
end
```

Place instructions **proc p** is $x := x * y$; and *write x* so that the value 14 appears on screen. Justify your answer by computing the output using the rules.

Exercise 2

1. Compute the effect of the sequence of instructions
PUSH 1; FETCH(x); ADD; STORE(x);
starting from a state of the abstract machine where the memory associates value 41 to x .
2. What happens when performing the code LOOP(TRUE,NOOP) ?

Exercise 3

Write the sequence of instructions to be performed by the abstract machine in order to compute the euclidian quotient of two non-negative integers a and b .

Exercise 4

Show that the transition relation defined by the operational semantics of the abstract machine is deterministic.