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); SUB; 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 exponentiation a^b, for non-negative integers a and b.