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# Homework - Version A.

## Exercise 1

We define the syntactic category of letters $L = \{a, b, c\}$. By $l$ we denote a meta-variable ranging over $L$. We define inductively a set of words $W$ by the following BNF:

$$w := l \mid w_1 c w_2 b \mid cwab$$

where $w, w_1, w_2$ are meta-variables ranging over the set of words $W$. Of the following two statements, one is wrong and one is right. You get to tell which is which and justify your answers by either a proof (by induction) or a counter-example.

1. The length of words in $W$ is congruent to 1 modulo 3.
2. All words in $W$ finish with a letter $b$.

## Exercise 2

We consider the following program.

```
begin  var  y := 2;
       var  x := 71 − y;
       proc plop is x := y + x;
       begin var  y := 1;
       proc p is call plop;
       proc plop is call x := y;
       call p;
       end
       call plop;
end
```

You have been presented three different semantics for the While language with blocks and procedures: one with dynamic links for variables and procedures, another with dynamic links for variables but static links for procedures, and finally one with static links for variables and procedures.
What values are associated to $x$ and $y$ at the end of this program according to each of the three semantics you know ? Justify your answer (you can either draw the tree or precise the state or the variable environment and the storage function after each ';').