Homework 9

To hand in on December 20th at the beginning of the exercise session, or by email at `schwoon@lmf.cnrs.fr`.

Answers can be written in French or in English.

Exercise 1. Consider the following program with a global boolean variable `x`.

```
bool x;

function main ()
  x = true;
  level1();
end;

function level1 ()
  level2();
  level2();
end;

function level2 ()
  x:=not x;
end;
```

1. Translate the program into a pushdown system with two control states $\top$ and $\bot$, representing the values of `x`.
2. Using the pre^* algorithm, compute the predecesors of the state where the program has ended.
3. In the automaton obtained in the previous question, what program behaviours can you deduce from the edges that start and end at either $\top$ or $\bot$?

Exercise 2. The pre^* algorithm requires to start with an automaton where no edge leads into an initial state. Show that this condition is necessary, i.e. find an automaton not respecting this condition and a PDS such that the algorithm applied to that instance yields a wrong result.