

## Homework 8

To hand in on December 12th at the beginning of the exercise session, or by email to `dghosh@lmd.cnr.fr` by the end of the day.

Answers can be written in French or in English.

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

```

bool x = false;

function main ()
m0: x = true;
m1: level1();
m2: return;

function level1 ()
a0: level2();
a1: level2();
a2: return;

function level2 ()
b0: x:=not x;
b1: return;

```

1. Translate the program into a pushdown system with two control states  $\top$  and  $\perp$ , representing the values of `x`, and the given line numbers as the stack alphabet. (Use example 2 of the slides as motivation.)
2. Using the  $pre^*$  algorithm, compute the predecessors of the state where the program has ended.

**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.