

## Model Checking – Exercise sheet 13

### Exercise 13.1

Consider the following recursive program:

```
procedure main;           procedure a;           procedure b;
m0: if ? then             a0: if ? then             b0: if ? then
    call a;               a1:  call b;               b1:  if ? then
    else                  a2:  call a;               b2:  call a;
    call b;               else
m1: return;              end if;                   end if;
                        a2: return;           end if;
                        end if;                   end if;
                        a2: return;           b2: return;
```

Recall that ? denotes a nondeterministic Boolean value.

1. Model the program with a pushdown system.
2. Compute all configurations that can reach the program label m1.

### Exercise 13.2

Consider the following recursive program with a global variable g and a local variable l:

```
boolean g;
procedure main(boolean l);
m0: if l then
    call a;
end if;
m1: assert(g == l);
m2: return;
procedure a();
a0: g := not g;
a1: if not g then
    call a;
a2:  call a;
end if;
a3: return;
```

1. Model the program with a pushdown system. Assume that the values of g and l are not initialized.
2. Compute all configurations that can reach the program label m2.
3. Compute all configurations that are reachable from the program label m0.