

### Exercises for “Formal Specification and Verification” Exercise sheet 8

#### Exercise 8.1:

Consider the following program:

```
1: if (y > 0) then skip else halt;  
2: x := 2*y;  
3: z := y;  
4: if (x <= z) then goto 6;  
5: exit  
6: error
```

(1) Describe the formulae for:

- initiation condition  $Init$
- Error condition  $\phi_{err}$
- The single statement transition relations in  $\mathcal{R}$
- The program transition relation  $\rho_{\mathcal{R}}$

(2) Compute  $post^i(Init, \rho_{\mathcal{R}})$  for  $i = 1, 2, 3, 4, 5, 6$ .

Can you determine a natural number  $n$  with  $\bigvee_{i=0}^n post^i(Init, \rho_{\mathcal{R}}) = \bigvee_{i=0}^{n+1} post^i(Init, \rho_{\mathcal{R}})$ ?

(3) Use the results in (2) to characterize  $\phi_{reach}$ .

(4) Show that no error state is reachable from the initial state.

**Remark:** You will be able to solve this exercise only after the lecture on Tuesday, 14.02.2017.

You can send me your solution or require clarifications by e-mail before Wed, 15.02.2017 at 12:00.