

# Language Based Security

*Summer Semester 2006*

*5. Homework*

*14 June 2006*

## Exercise 1:

Consider the following code discussed in the lecture.

```
prod : r3 := 0;          loop : if r1 jump done;
      jump loop         r3 := r2 + r3;
                        r1 := r1 + -1;   done : jump r4   halt : jump halt
                        jump loop
```

Unlike as in the lecture, we use the heap type  $\Psi$  defined as below.

$$\Gamma_1 = \{r1 : \text{Top}, r2 : \text{Top}, r3 : \text{Top}, r4 : \text{Top}\}$$
$$\Gamma_2 = \{r1 : \text{Top}, r2 : \text{Top}, r3 : \text{Top}, r4 : \text{Code}(\Gamma_1)\}$$
$$\Gamma_3 = \{r1 : \text{Int}, r2 : \text{Int}, r3 : \text{Int}, r4 : \text{Code}(\Gamma_1)\}$$
$$\Psi = \{\text{prod} : \text{Code}(\Gamma_3), \text{loop} : \text{Code}(\Gamma_3), \text{done} : \text{Code}(\Gamma_2), \text{halt} : \text{Code}(\Gamma_1)\}$$

Show that each of the instruction sequences is well-typed under the heap type  $\Psi$ .