Technische Universität München *Summer Semester 08*
Fakultät für Informatik *K N Verma*
Prof. Dr. H. Seidl *verma@in.tum.de*

Virtual Machines

Exercise Sheet 6

Deadline: 3 June 2008, during lecture, by email, or in room 02.07.041

Exercise 1:

10 Points

Consider the following Call-By-Value generated code for a PuF expression.

```
   alloc 1
   pushloc 0
   mkvec 1
   mkfunval _0
   jump _1
_0:targ 2
   pushloc 0
   getbasic
   pushloc 2
   getbasic
   gr
   jumpz _2
   mark _4
   pushloc 3
   getbasic
   pushloc 5
   getbasic
   sub
   mkbasic
   pushloc 5
   pushglob 0
   apply
_4:jump _3
_2:pushloc 0
   getbasic
   pushloc 2
   getbasic
   le
   jumpz _5
   mark _7
   pushloc 4
   getbasic
   pushloc 4
   getbasic
   sub
   mkbasic
   pushloc 4
   pushglob 0
   apply
_7:jump _6
_5:pushloc 0
_6:
_3:return 2
_1:rewrite 1
   mark _8
   loadc 6
   mkbasic
   loadc 4
   mkbasic
   pushloc 5
   apply
_8:slide 1
   halt
```

a) Determine the stack distance sd for every program point (initially $sd = 0$).

b) What does this program compute ?

Exercise 2:

3+7 Points

Compute $code_V$ for the following expressions

a)
```
let x = 5 + 5 in x * x
```
using CBN with $\rho = \emptyset$ and $sd = 0$.

b)
```
letrec
fib = fn x => if x <= 1 then 1 else (fib (x-1)) + (fib (x-2))
in fib 4
```
using CBV with $\rho = \emptyset$ and $sd = 0$.