Software-Modellierung und Verifikation
Informatik 2
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9. Exercise sheet *Semantics and Verification of Software 2007*

Due to Wed., 20 June 2007, *before* the exercise course begins.

Exercise 9.1:

Perform a *common subexpression elimination* on the following program (using temporary variables):

$x := x + 1;$
$y := 1;$
while $x * y \neq z$ **do**
  if $x * y > z$ **then**
    $x := x + 1;$
    $y := 1;$
  else
    $y := y + 1;$

Exercise 9.2:

Perform an *available expression analysis* for the following nonterminating program:

$z := x + y;$
while true do skip

Determine all solutions of the corresponding equation system.

Exercise 9.3:

A modification of the *available expressions analysis* detects when an expression is available in a *particular variable*: an expression a is available in x at label l if it has been evaluated and assigned to x on all paths leading to l and if the values of x and the variables in the expression have not changed since then. Develop the data flow equations for this analysis.

Exercise 9.4:

Perform a *live variable analysis* for the following program:

$y := 1;$
while $x > 0$ **do** $x := x - 1;$
$y := 2;$