Compiler Construction WS09/10

Exercise Sheet 9

Please hand in the solutions to the theoretical exercises until the beginning of the lecture next Wednesday 2010-01-13, 10:00. Please write the number of your tutorial group or the name of your tutor on the first sheet of your solution. Solutions submitted later will not be accepted.

**Exercise 9.1: Global Variable Numbering (Points: 3)**

Reconsider the global variable numbering. How is congruence initialized for the $\phi$'s?

Hint: Refer to Section 2.5 of Alpern, Wegman, Zadeck: *Detecting equality of variables in programs*.

**Exercise 9.2: Partial Redundancy Elimination (Points: 2+3)**

1. Give an example where the elimination of partial redundancies generates partially dead code.

2. Prove that given a path $P : a \rightarrow^+ b$, where
   a) $a$ is down-safe and earliest,
   b) $b$ has a use of $\tau(a, b)$,
   c) $P$ contains no use or definition of $a$ or $b$.
   there is no node between $a$ and $b$ that is earliest.

   Hint: Show that for all nodes $n$ on $P$ all predecessors of $n$ are down-safe.