Please hand in the solutions to the theoretical exercises until the beginning of the next lecture, Wed. 2011-06-01, 10:00. Please write the number of your tutorial group and/or the date/time slot on the first sheet of your solution.

Exercise 6.1: Reaching Definitions (Points: 8)

**Design** Design a static analysis that determines which variable definitions reach which program points. Your analysis shall compute for each program point $u$ the set $R[u]$ that contains for each program variable $x \in Vars$ a pair $(x, p)$, where $p$ is the program point at which $x$ was defined, i.e., lastly written to.

Please state explicitly what domain you use for your information carriers and what its top and bottom elements are. Furthermore, give a definition of the edge effects for all language constructs of our toy language, define the MOP, and state how to construct the systems of inequalities used to compute the MOP.

**Example** Consider the following program. Draw its control-flow graph and construct the system of inequalities your reaching definitions analysis generates for this program. Find a least solution to this system of inequalities using a worklist algorithm!

```plaintext
x = 314;
y = 42;
i = 0;
c:
  if(x > 0) {
    x = x - y;
i = i + 1;
goto c;
  }
```