CSE 231 Fall 2005 HW 1 Due Tues Oct 4 in class

Please check the web page for homework policy.

Problems:
Consider the following code:

<s1> L0: a := 1
<s2> b := 2
<s3> L1: c := c * sqrt(a)
<s4> if (a < b) go to L2
<s5> b := b * c
<s6> go to L3
<s7> L2: a := a/d
<s8> go to L3
<s9> L3: if (a+b > 10) then go to L1
<s10> L4: c := b * b
<s11> if (c < 100) then go to L1
<s11> L5: print(a,b)

1. Control Flow Graph, Dominator, Depth First Spanning Tree
   (a) Give the Control Flow Graph for the code, showing the basic blocks and the edges between them.
   (b) Give the Dominator Tree for your CFG.
   (c) Determine the natural loops of the CFG.
   (d) Give a Depth First Spanning tree of the CFG, and show a preorder numbering of the nodes.
   (e) Determine the back, forward and cross edges for your numbering.
2. The *Upwards Exposed Uses* are the uses of a variable at given points that may not be reached by a definition of a variable in the program. Compute the Upwards Exposed Uses for the code in Problem 1, using the iterative method with sets of uses of variables (numbered by statement number) being the unit of propagation.

(a) Show the Gen and Kill sets for each basic block.

(b) Show the dataflow equations for UpEexpIn and UpExpOut, and solve the equations iteratively, showing your work. Indicate the final values of the UpExpin and UpExpout sets.