

Homework 4

Due **November 25**, Tuesday

On campus students must turn in a hard in class, with a cover page that has the student's name on it, which allows the grader to write the grade on the next page. **Distant –learning students must submit on the Blackboard by midnight, November 25. (This is to ensure the submissions to be received by the teaching staff.)**

1 (20 pts).

Use a work list to solve the problem in Exercise 9.2.1 in the textbook, which computes reaching definitions.

2 (20 pts).

Use a work list to solve the problem in Exercise 9.2.3 in the textbook. After computing live variables, please draw the interference graph.

3 (20 pts).

(1) **(4 pts)** In the lecture, we discussed the proof of the claim that if a dominates b in the control flow graph, then $\text{rpost}(a) < \text{rpost}(b)$, where rpost means reversed post order number. Please write down the proof.

(2) **(16 pts)** Solve the problems in Exercise 9.6.3 in the textbook, using the proved claim in (1) above where applicable.

4 (20 pts).

Use the properties proved in Problem 3 above, wherever applicable, to solve the problems in Exercise 9.6.1 (i) to (v). NOTE: For (i), use a work list to compute the dominators for each node. For (v), the term “advancing” is the same as the term “forwarding” in the lecture notes.

5 (20 pts)

(i) **(10 pts)** Compute the post dominator tree for the flow graph of Fig. 9.10 in the textbook.

(ii) **(10 pts)** Compute the post dominance frontiers of the nodes in the flow graph mentioned above by properly traversing the post dominator tree.