Questions week 2

1. Give the definition of dominance frontiers.

2. Why is a worklist used for the insertion of \( \phi \)-functions? Why not just put one \( \phi \)-function in each vertex in the dominance frontier of the vertex of a definition of a variable?

3. Explain the purpose of each of \( DF_{local} \) and \( DF_{up} \).

4. Consider the following code fragment

   ```
   if (x == y)
       a = x+1;
   else
       a = y+2;
   return a;
   ```

   There will be a \( \phi \)-function after the if-statement. We know that in SSA form, the definition of a variable version must dominate every use of that version. However, none of the assignment statements dominate the \( \phi \)-function. Please explain what is happening.

5. Why are critical edges important?

6. How can copy propagation during translation to SSA form be done very easily?

7. Who invented the algorithm for register allocation which is based on simplifying and later assigning colors to the nodes of an interference graph?

8. When are edges added to the interference graph for register allocation based on graph coloring?

9. How should copy statements be treated in order to avoid, when possible, interference graph edges between their source and destination operands?

10. What is optimistic coloring?