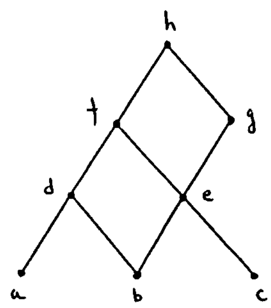
Part II:

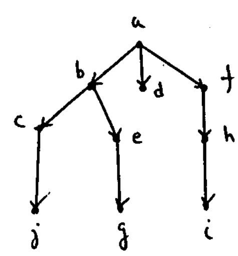
1. Show that among n+1 arbitrarily chosen integers, there are two whose diference is divisible by n. 10 points

2. For a lattice L, show that a) implies b) in the following:
a) $a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$ for all a, b, c in L;
b) $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$ for all a, b, c in L.
10 points

3. Consider the Hasse diagram of the poset R on A={a,b,c,d,e,f,g,h} on the right: Find
1) upper bounds of {e,c}
2) minimal elements
3) least element
4) greatest lower bound of {f,d}
5) lower bounds of {h,f}
15 points



4. Consider the labeled tree T whose digraph is shown below:



Draw the digraph of the corresponding binary positional tree B(T). Label the vertices of B(T) to show their correspondence to vertices of T. Suppose that visiting a node results in printing out the label of that node. Show the result of performing 1) preorder 2) inorder 3) postorder for B(T).
20 points

5. Let S={1,2,3,4,5} and let A=S×S. Define the following relation R on A: (a,b) R (a',b') if and only if ab'=a'b.
1) Show that R is an equivalence relation.
2) Compute A/R.
20 points

042