Due: Tue. Apr. 17, 2012.

Question 1 (60%) 
For each of the following relations  
(1) State whether it is a partial order or not 
(2) Give the reason for your answer 
(a) isFatherOf 
(b) isAncestorOf 
(c) isOlderThan 
(d) isSisterOf 
(e) \{(a, b), (a, a), (b, a)\} 
(f) \{(2, 1), (1, 3), (2, 3)\} 

Question 2 (20%) 
(1) Draw a poset diagram for the set \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}, with the subset relation. 
(2) Describe the glb and lub of pairs of pairs of elements in terms of set operations (such as union, intersection, etc...). That is, given two sets \(S\) and \(T\) in the above set, what is the glb of \(S\) and \(T\)? What is the lub of \(S\) and \(T\)? 

Question 3 (20%) 
Consider the poset \{a,b,c,d,e,f,g,h\}, with the relation \{(a,e),(b,d),(b,f),(c,a),(d,c),(d,h),(f,c),(g,b),(h,a)\}. 
(1) Use the topological sort algorithm to obtain a sorted order of these elements that is consistent with the given partial order. Give some details (but not too much!)  
(2) Is the sequence (gbfcdhiae) consistent with the given partial order? Why?