Fourth Quiz for CSI35

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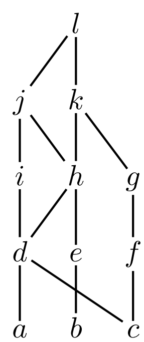
Directions: This quiz is due Thursday November 16, at 6:00 PM. Please make sure to *justify* all your answers. **No credit will be given for unjustified answers.**

1. Let $A = \{1, 2, 3, 4\}$. Draw the Hasse diagram for the poset $(\mathcal{P}(A), \subseteq)$, where $\mathcal{P}(A)$ stands for the power set of A.

2. Consider the partial order represented by the following Hasse diagram:



   (a) Find the maximal elements.
   (b) Find the minimal elements.
   (c) Is there a largest element?
   (d) Is there a least element?
   (e) Find all upper bounds of $\{a, b, c\}$.
   (f) Find the least upper bound of $\{a, b, c\}$, if it exists.
   (g) Find all lower bounds of $\{j, k, g\}$.
   (h) Find the greatest lower bound of $\{j, k, g\}$, if it exists.

3. Let $(P, \preceq)$ be a poset that has only one minimal element m. Is m necessarily minimal? If your answer is affirmative then you should prove it, if it is negative then you should provide a counterexample.

4. A graph G has six vertices with the following degrees: $5, 3, 3, 2, 4, 1$.
   (a) How many edges does G have?
   (b) Draw two non isomorphic such graphs.

5. Is the graph that you drew in Question 1 bipartite? How about the one in Question 2?

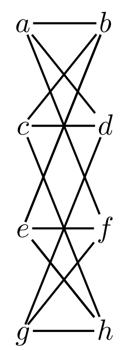
6. Prove that the cycle C_n is bipartite if and only if n is even.

7. A graph G has the following *incidence* matrix

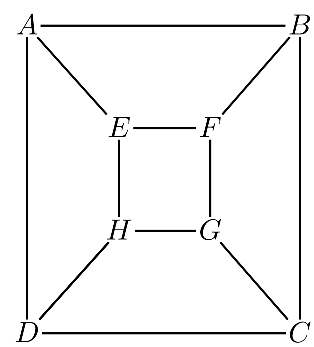
$$\begin{pmatrix} 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{pmatrix}$$

Find an *adjacency* matrix for G.

8. Prove that the graphs G_1 and G_2 are isomorphic.



G_1



G_2