# Fourth Quiz for CSI35
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Directions: This quiz is due Thursday November 13, at 2:00 PM. Please make sure to *justify* all your answers. **No credit will be given for unjustified answers.**

1. How many equivalence relations are there on the set $\{1, 2, 3, 4, 5\}$?

2. Let $A = \{1, 2, \ldots, 20\}$. Draw the Hasse diagram for the poset $(A, |)$, where $|$ stands for the divisibility relation:
$$a \mid b \iff \exists c \in \mathbb{N} \quad b = ac$$

3. List all 2×2 zero-one matrices. Which of these matrices represent reflexive relations on $\{0, 1\}$? Which represent symmetric relations? antisymmetric?

4. Consider the partial order represented by the following Hasse diagram:
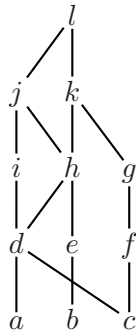
   (a) Find the maximal elements.
   (b) Find the minimal elements.
   (c) Is there a largest element?
   (d) Is there a least element?
   (e) Find all upper bounds of $\{a, b, c\}$.
   (f) Find the least upper bound of $\{a, b, c\}$, if it exists.
   (g) Find all lower bounds of $\{j, k, g\}$.
   (h) Find the greatest lower bound of $\{j, k, g\}$, if it exists.

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

6. **Extra Credit:** Write a program that lists all partitions of $\{1, 2, 3, 4, 5\}$ into disjoint sets.