1. Let $P = \{1, 2, 3, 5, 30\}$ ordered by divides.
   (a) Draw the Hasse diagram for P.
   (b) Find the chromatic number $\chi(G)$, where G is the Hasse diagram for P.
   (c) Use a counting argument to find the chromatic polynomial $P(G, t)$, where G is the Hasse diagram for P.
   (d) Use the Edge Theorem to find $P(G, t)$, where G is the Hasse diagram for P.

2. Let $P = \{3, 6, 15, 12, 30, 60\}$ ordered by divides.
   (a) Draw the Hasse diagram for P.
   (b) Find $\chi(G)$, where G is the Hasse diagram for P.
   (c) Use the Union Theorem to find $P(G, t)$, where G is the Hasse diagram for P.

3. Show that K_n has an Eulerian Circuit $\iff$ n is odd.

4. Draw a Hasse diagram for each isomorphism class of posets with 4 elements.
   Hint: There are 16 isomorphism classes.

5. Let $P = \{2, 3, 4, \ldots, 100\}$ ordered by divides. Find $\mathrm{Max}(P)$ and $\mathrm{Min}(P)$.

6. Let $\mathbb{Z}$ denote the set of integers, and define

$$a \sqsubseteq b \iff b - a \text{ is a nonnegative even integer}$$

   (a) Show that $\sqsubseteq$ is a partial order of $\mathbb{Z}$.
   (b) Draw a Hasse diagram for the poset $(\mathbb{Z}, \sqsubseteq)$.

7. Given posets P and Q, let $P \times Q$ be the poset defined in Graded Homework 4.

   Prove: (x', y') covers $(x, y) \iff (x' = x$ and y' covers $y)$ or $(x'$ covers x and $y' = y)$.