1. Let $R$ be the relation of ordered pairs of positive integers such that $((a,b),(c,d)) \in R$ if and only if $ad=bc$. Show that $R$ is an equivalence relation.

2. What is the congruence class $[4]_m$ when $m$ is
   a) 2?    b) 3?

3. Determine the number of different equivalence relations on a set with three elements by listing them.

4. Draw the Hasse diagram for divisibility on the set $\{1,2,3,4,5,6,7,8\}$ and of $\{1,2,3,6,12,24,36,48\}$.

5. Which of these are posets?
   a) $(R,=)$  b) $(R,<)$  c) $(R,\leq)$  d) $(R,\neq)$

6. Which of these pairs of elements are comparable in the poset $(\mathbb{Z}^{\{\pm\}},|)$?
   a) 5, 15  b) 6, 9  c) 8, 16  d) 7, 7

7. Show that $\{(x,y)|x-y \in \mathbb{Q}\}$ is an equivalence relation on the set of real numbers, where $\mathbb{Q}$ denotes the set of rational numbers. What are $[1],[1/2]$ ?

8. Find the smallest equivalence which contains the relation $\{(1,1),(1,3),(2,1),(2,3),(2,4),(3,2),(3,4),(4,1)\}$.

9. Find two incomparable elements in these posets.
   a) $(P(\{0,1,2\}),\subseteq)$  b) $(\{1,2,4,6,8\},\mid)$

10. Show that there is exactly one greatest element of a poset, if such an element exists.