

9.6 Partial Orderings

9.6 pg. 630 # 1

Which of these relations on $\{0, 1, 2, 3\}$ are partial orderings? Determine the properties of a partial ordering that the others lack.

- a) $\{(0, 0), (1, 1), (2, 2), (3, 3)\}$
- b) $\{(0, 0), (1, 1), (2, 0), (2, 2), (2, 3), (3, 2), (3, 3)\}$
- c) $\{(0, 0), (1, 1), (1, 2), (2, 2), (3, 3)\}$
- d) $\{(0, 0), (1, 1), (1, 2), (1, 3), (2, 2), (2, 3), (3, 3)\}$
- e) $\{(0, 0), (0, 1), (0, 2), (1, 0), (1, 1), (1, 2), (2, 0), (2, 2), (3, 3)\}$

9.6 pg. 630 # 3

Is (S, R) a poset if S is the set of all people in the world and $(a, b) \in R$, where a and b are people, if

- a) a is taller than b ?
- b) a is not taller than b ?
- c) $a = b$ or a is an ancestor of b ?
- d) a and b have a common friend?

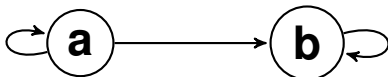
9.6 pg. 630 # 5

Which of these are posets?

- a) $(\mathbf{Z}, =)$
- b) (\mathbf{Z}, \neq)
- c) (\mathbf{Z}, \geq)
- d) (\mathbf{Z}, \dagger)

9.6 pg. 630 # 11

Determine whether the relation with the directed graph shown is a partial order.



9.6 pg. 630 # 19

Find the lexicographic ordering of the bit strings 0, 01, 11, 001, 010, 011, 0001, and 0101 based on the ordering $0 < 1$.

9.6 pg. 631 # 23

Draw the Hasse diagram for divisibility on the set

- a) $\{1, 2, 3, 4, 5, 6, 7, 8\}$
- b) $\{1, 2, 3, 5, 7, 11, 13\}$
- c) $\{1, 2, 3, 6, 12, 24, 36, 48\}$

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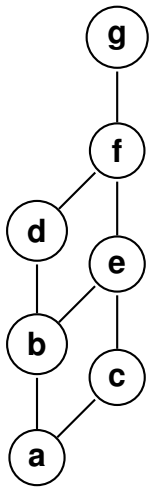
Answer these questions for the poset $(\{3, 5, 9, 15, 24, 45\}, |)$.

- a) Find the maximal elements.
- b) Find the minimal elements.
- c) Is there a greatest element?
- d) Is there a least element?
- e) Find all upper bounds of $\{3, 5\}$.
- f) Find the least upper bound of $\{3, 5\}$, if it exists.
- g) Find all lower bounds of $\{15, 45\}$.
- h) Find the greatest lower bound of $\{15, 45\}$, if it exists.

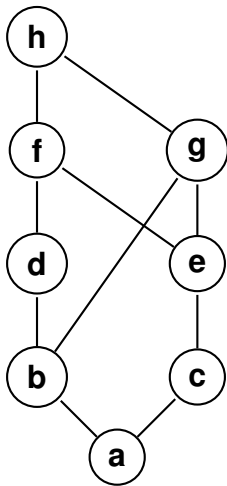
9.6 pg. 632 # 43

Determine whether the posets with these Hasse diagrams are lattices.

- a)



b)



9.6 pg. 633 # 67

Find an ordering of the tasks of a software project if the Hasse diagram for the tasks of the project is shown.

