Chapter 9.5

Q11: Show that the relation R consisting of all pairs (x, y) such that x and y are bit strings of length three or more that agree in their first three bits is an equivalence relation on the set of all bit strings of length three or more.

Recall that a relation *R* on a set *A* is

(i) Reflexive if $(a,a) \in R$ for all $a \in A$

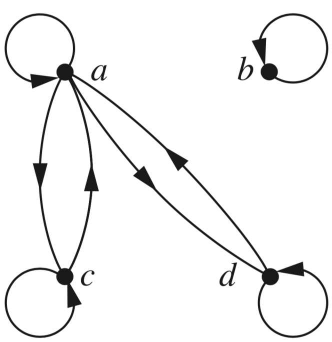
(ii) Symmetric if $(a,b) \in R$ implies that $(b,a) \in R$

(iii) Transitive if $(a,b),(b,c) \in R$ implies that $(a,c) \in R$

(iv) An equivalence relation if it is reflexive, symmetric and transitive.

Q15: Let R be the relation on the set of ordered pairs of positive integers such that ((a, b), (c, d)) ∈ R if and only if a + d = b + c. Show that R is an equivalence relation.

Q21: determine whether the relation with the directed graph shown is an equivalence relation.



Q25: Show that the relation R on the set of all bit strings such that s R t if and only if s and t contain the same number of 1s is an equivalence relation.

Q35: What is the congruence class $[n]_5$ (that is, the equivalence class of n with respect to congruence modulo 5) when n is

a) 2 b) 3 c) 6 d) -3

Q41: Which of these collections of subsets are partitions of {1,2,3,4,5,6}?
a) {1,2},{2,3,4},{4,5,6}

b) {1}, {2,3,6}, {4}, {5}

c) {2,4,6}, {1,3,5}

d) {1,4,5}, {2,6}

Chapter 9.6

Q3: Is (S,R) a poset if S is the set of all people in the world and (a, b) ∈ 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?

Q15: Find two incomparable elements in these posets.
a) (P({0,1,2}),⊆)

b) ({1,2,4,6,8},|)

Q23: 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}

Q33 Answer these questions for the 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.