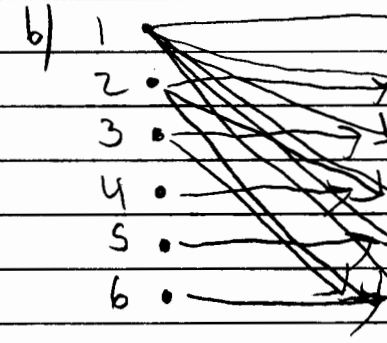
Assignment 12

8.1

2) a) $\{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,2), (2,4), (2,6), (3,3), (3,6), (4,4), (5,5), (6,6)\}$

b) 

c)

	1	2	3	4	5	6
1	X	X	X	X	X	X
2		X		X		X
3			X			X
4				X		
5					X	
6						X

4) a) antisymmetric, transitive
b) reflexive, symmetric, transitive
c) reflexive, symmetric, transitive
d) reflexive, symmetric

6) a) symmetric
b) reflexive, symmetric, transitive
c) reflexive, symmetric, transitive
d) antisymmetric
e) reflexive, symmetric
f) symmetric
g) antisymmetric, transitive
h) symmetric

10) a 12) a, d, f, g, h 14) if $(a,a) \in R$ for every element $a \notin R$

→

28| a) $\{(1,1),(1,2),(2,1),(2,2),(2,3),(3,1),(3,2),(3,3),(3,4)\}$ $R_1 \cup R_2 = \boxed{R_2}$

b| $\{(1,2),(2,3),(3,4)\}$ $R_1 \cap R_2 = \boxed{R_1}$

c| $\{\}$ $R_1 - R_2 = \boxed{\{\}}$

d| $\{(1,1),(2,1),(2,2),(3,1)(3,2),(3,3)\} = R_2 - R_1$

36| $(a,b) \in R$ parent $(a,c) \in R \circ R$ grandparent $(a,d) \in R \circ R \circ R$

So, R in great grandparent relation

8.2

2| (3,2,1,1) (3,1,2,1) (3,1,1,2) (1,3,2,1) (1,3,1,2) (1,1,3,2) (2,3,1,1) (2,1,3,1) (2,1,1,3) (1,2,3,1) (1,2,1,3) (1,1,2,3) (1,1,1,6) (1,1,6,1) (1,6,1,1) (6,1,1,1)

4| a) Course b) Course_number
c) Course_number, d) Departure_time

6| Professor and Time, Professor and Course_number

10| (Cruz, Zoology, 335, A100, 9:00 AM)
(Cruz, Zoology, 412, A100, 8:00 AM)
(Farber, Psychology, 501, A100, 3:00 PM)

14| (b, c, e) 18| 3 components

22) Both sides of this equation combine the set of n-tuples with m-tuples that are in R and S and satisfy condition C.

8.3

2) a) $\begin{bmatrix} 0&1&1&1 \\ 0&0&1&1 \\ 0&0&0&1 \\ 0&0&0&0 \end{bmatrix}$ b) $\begin{bmatrix} 1&0&0&1 \\ 0&1&0&0 \\ 0&0&1&0 \\ 1&0&0&0 \end{bmatrix}$

c) $\begin{bmatrix} 0&1&1&1 \\ 1&0&1&1 \\ 1&1&0&1 \\ 1&1&1&0 \end{bmatrix}$ d) $\begin{bmatrix} 0&0&0&0 \\ 0&0&0&1 \\ 1&1&0&1 \\ 0&0&0&0 \end{bmatrix}$

4) a) $\{(1,1),(1,2),(1,4),(2,1),(2,3),(3,2),(3,3),(3,4),(4,1),(4,3),(4,4)\}$

b) $\{(1,1),(1,2),(1,3),(2,2),(3,3),(3,4),(4,1),(4,4)\}$

c) $\{(1,2),(1,4),(2,1),(2,3),(3,2),(3,4),(4,1),(4,3)\}$

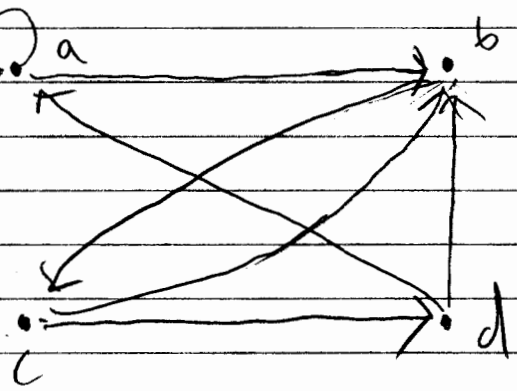
8) a) symmetric, irreflexive, transitive
b) reflexive, antisymmetric
c) irreflexive, symmetric, transitive

14) a) $\begin{bmatrix} 0&1&0 \\ 1&1&1 \\ 1&1&1 \end{bmatrix}$ b) $\begin{bmatrix} 0&1&0 \\ 0&1&1 \\ 1&0&0 \end{bmatrix}$ c) $\begin{bmatrix} 0&1&1 \\ 1&1&1 \\ 0&1&0 \end{bmatrix}$

→

d) $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ e) $\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

22)



24) $\{(a,a),(a,c),(b,a),(b,b),(b,c),(c,c)\}$