Problem Sheet -4

1. Set {1,2,3,4}

a) {(2,2), (2,3), (2,4), (3,2), (3,3), (3,4)}.

-> Not Reflexive (1,1) not there
-> Not symmetric (4,2) not there
-> Not Asymetric (3,2) is there.
-> Transitive

b) {(2,4), (4,2)}.

-> Not Reflexive (1,1) not there
-> Symmetric
-> Not Asymmetric (4,2) and (2,4)
-> Not Transitive (2,2) not there.

c) {(1,3), (1,4), (2,3) (2,4), (3,1) (3,4)}.

-> Not Reflexive (1)not there.
-> Not Symmetric (4,1) not there
-> Not Asymmetric (3,1) & (1,3) are there.
-> Not Transitive (1,1) not there.

2. a. $x \neq y$.

-> not reflexive (1,1) not there
-> Symmetric
-> Not Antisymmetric (2,1) & (1,2) are there.
-> Not Transitive (1,2) & (2,1) $\in R$ but not (1,1)

Q b. $xy >= 1$

-> Not Reflexive $(1/4, 1/4)$
-> Symmetric
-> Not Antisymmetric $(1,2)$ & $(2,1)$ are there
-> Not Transitive. $(100, 1/4)$ & $(1/4, 100) \in R$
$\hookrightarrow (1/4, 1/4) \notin R$.

c. $x = y+1$ or $x = y-1$.

-> Not reflexive cant have $(1,1)$
-> Symmetric
-> Not Antisymmetric $(1,2) \& (2,1)$
-> Not Transitive $(1,2) \& (2,3) \in R$
$(1,3) \notin R$

d. x is a multiple of y.

-> Reflexive.
-> Not Symmetric $(4,2) \in R$ $(2,4) \notin R$
-> Not Antisymmetric $(1,1) \in R$.
-> Transitive.

e. $x = y^2$.

-> Not reflexive $(2,2)$ not there.
-> Not Symmetric $(4,2) \in R$ $(2,4) \notin R$
-> Not Antisymmetric $(1,1) \in R$
-> Not Transitive $(4,2) (16,4) \in R$
$(16,2) \notin R$

f.

3 $R_1 = \{(1,2), (2,3), (3,4)\}$ $R_2 = \{(1,1)\ (1,2)\ (2,1)\ (2,2), (2,3)\ (3,1)\ (3,2)\ (3,3)\ (3,4)\}$

a. $(R_1 \cup R_2)$

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

b. $R_1 \cap R_2$

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

c. $R_1 - R_2$ => Null Set

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

4. R_1 -> x divides y. R_1

R_2 -> x is a multiple of y.

a. $R_1 \cup R_2$. $(a,b) \in (b,a)$

b $R_1 \cap R_2$. -> (a,a)

c. $R_1 - R_2$ -> $\forall (a,b) \in R_1$ such that $a \neq b$.

d. $R_2 - R_1$ -> $(a,b) \in R_2$ such that $a \neq b$.

5. R. {(1,2), (1,3), (2,3), (2,4), (3,1)}
S {(2,1), (3,1), (3,2), (4,2)}.

∴ composition R.

{(2,2), (3,3), (4,4)}.

5. R. {(1,2), (1,3), (2,3), (3,4), (3,1)}
S {(2,1), (3,1), (3,2), (4,3)}.

Composition R.

{(2,2), (3,3), (4,4)}

6 a.

R:	1	2	3	4	5
1	1	1	1	0	0
2	0	0	1	1	0
3	1	0	0	1	1
4	0	1	0	0	1
5	1	1	0	0	1

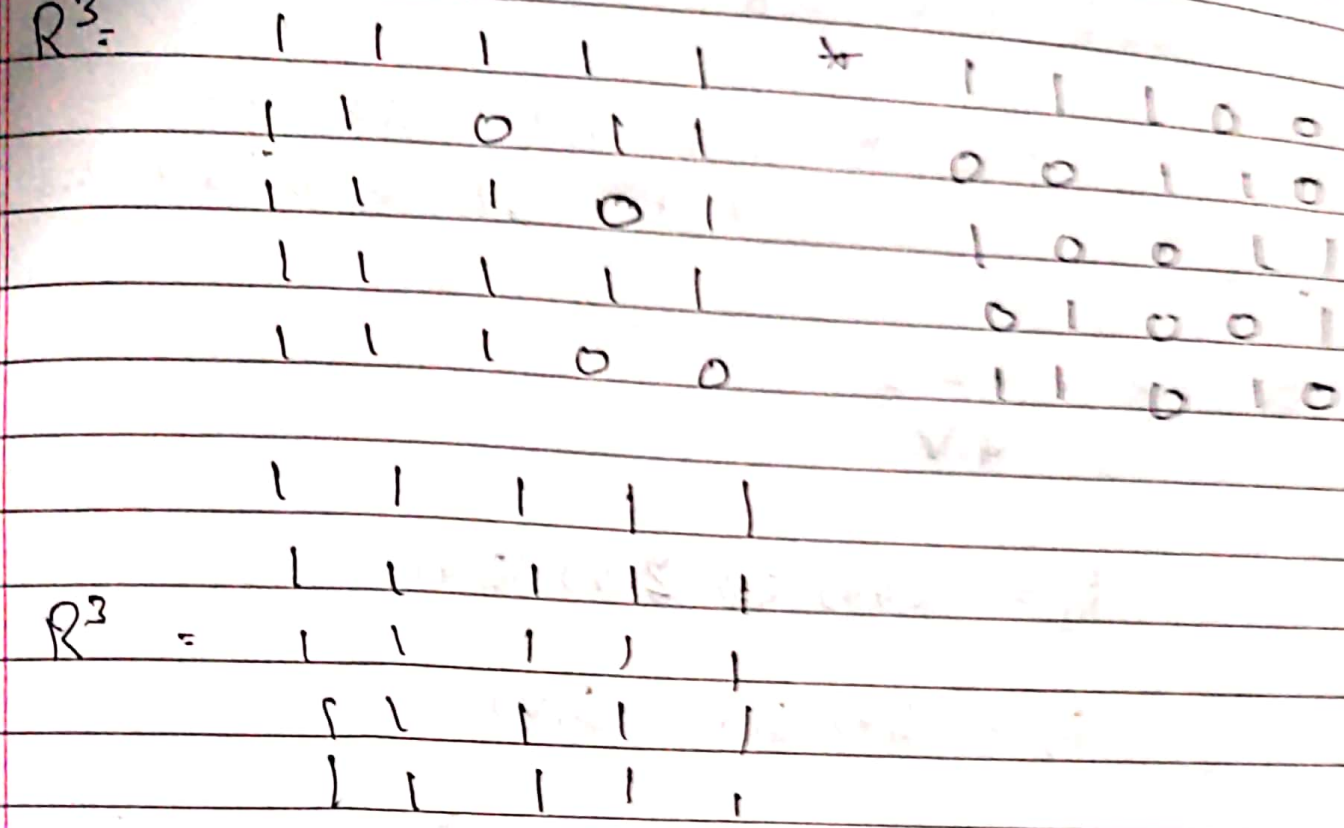
a.

1	1	1	0	0
0	0	1	1	0
1	0	0	1	1
0	1	0	0	1
1	1	0	1	0

1	1	1	0	0
0	0	1	1	0
1	0	0	1	1
0	1	0	0	1
1	1	0	1	0

$R^2 =$

1	1	1	1	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1
1	1	1	0	0



$R^4 = R^5 = R^3$.

7.

R = 1,2 1,4 1,6 1,8 1,10
3,5 3,7 4,6 6,8 7,10

S = (2,4) (3,6) 57 79 810
89 88 99 58 49

a. R ° S = 2,6 3,8 5,10

b S ° R. = 1,4 1,9 1,10 1,8
1,7 3,9 6,10 6,9 6,8

8. A = 1,2,3
B = 4,V

R_1 = (1,4), (2,4) (2,V) (3,4)

R_2 = (1,V) (3,4) (3,V)

a. (1,4) (2,4) (2,V) (3,4) (1,V) (3,V)

b. d (3, 4)

c.

X	U	V
1	1	0
2	1	1
3	1	0

x	a	V
d	1	0 1
2	0	0
3	1	1

b. (1,4) (2,4) (2,V)

f. (1,u) (3,v) (2,u) (1,v) (3,v)

g. {(1,2,3), (2,3,4)}

10. {(1116), (1611), (6111), (116)}

11. Primary Keys {122, 221, 323, 199, 222, 322}.

Composite key. Nadir 122
Acme 122.

12. ~~Record 1, 4~~
Record 1, Record 5 & Record 7.

13.

Airline	flight Number	Destination
Nadir	122	Detroit
Acme	221	Denver
Acme	122	Achorage
Acme	323	Honolulu
Nadir	199	Detroit
Acme	222	Denver
Nadir	322	Detroit

14.

Supplier	Part_number	project	Quantity	Color
23	1092	1	2	2
23	11014	3	1	1
23	9048	4	12	2
31	4975	3	6	2
31	3477	2	25	2
32	6984	4	10	1
32	9191	2	80	4
33	1001	1	14	8