6.1.1 c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ $\{(1,1), (2,2), (3,3)\}$

6.1.2 e) $\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix}$ $\{(1,1), (1,4), (2,2), (3,3), (4,1), (4,4)\}$

6.2.2 a) $xRy : x \geq y$ $a \in A$ $a_i \neq a_j$

Reflexive

Anti-symmetric

Transitive

b) $xRy : x \geq y$ $a \in A$ $(a_i = a_j) \geq 1$

Reflexive $(a_i \neq a_j) \geq 1$

Neither $x \geq y$ $y \geq x$

Transitive

c) $xRy : x \geq y$ $a \in A$ $(a_i = a_j) = |A|$

Reflexive

Symmetric $x \geq x$

Transitive

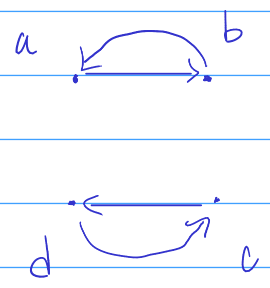
6.2.4 c) The domain of relation R is $\{a, b, c, d\}$

$R = \{(a,b), (b,a), (c,d), (d,c)\}$

Anti Reflexive

Symmetric

Not transitive



6.3.3 a) e , 3

b) a , 4

c) (a, a), (b, b), (e, e)

d) It is a walk.

It is a open walk.

e) It is not a walk

f) It is a walk

It is a open walk

It is a trail only.

g) $\langle b, b, d, e, e \rangle$

6.3.4 a) trail

1 $\langle 1, 2 \rangle$

2 $\langle 1, 2, 3 \rangle$

3 $\langle 1, 2, 2, 3 \rangle$

4 $\langle 1, 2, 2, 3, 2 \rangle$

5 $\langle 3, 1, 2, 2, 3, 2 \rangle$

b) path

1 $\langle 1, 2 \rangle$

2 $\langle 1, 2, 3 \rangle$

c) circuit

1 $\langle 2, 2 \rangle$

2 $\langle 2, 3, 2 \rangle$

3 $\langle 1, 2, 3, 1 \rangle$

4 $\langle 1, 2, 2, 3, 1 \rangle$

d) 1 $\langle 2, 2 \rangle$

2 $\langle 2, 3, 2 \rangle$

3 $\langle 1, 2, 3, 1 \rangle$

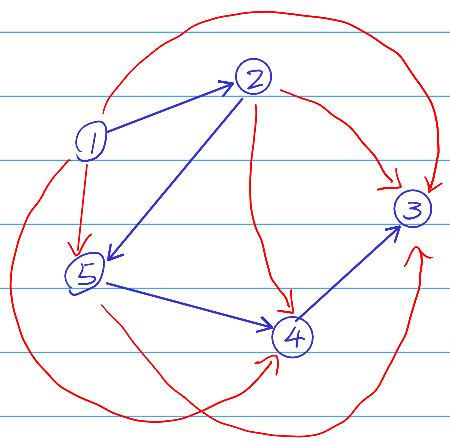
6.4.2 d) $R_3 \circ R_1 = \{(x,z) : x < z\} = R_3$

6.4.5 a) True, for every element (x,x) in R and S, (x,x) is also in $S \circ R$.

e) False.

i) False.

6.5.3 b)



6.5.4 a) No, (4,5) is not in G^3

b) No, no self loop in G^2

c) Yes, (1,1), (2,2), (3,3), (4,4), (5,5)

d) Yes,

e) Yes, (2,3) is in G^2 and (3,3) is in G^3

f) Yes, (2,4) is in G^3

h) Yes, (3,1), (3,5)

i) Yes, (4, x)

6.2.1 c) $P = xPy : x^n = y$ $\quad x, y, n \in \mathbb{Z}^+$

Reflexive $\quad xPx \to x^1 = x$

Antisymmetric $\quad xPy \quad yPx \quad x^n = y$

Transitive $\quad y^m = x$

$(x^n)^m = x$

m and n must be 1

$xPy \quad yPz \quad x^n = y$

$y^m = z$

$(x^n)^m = z$

i) $T = xTy : x + y = 0$

Anti reflexive $\quad xTx \quad x + x = 0$

Symmetric $\quad x + (-x) = 0$

Transitive $\quad xTy$

yTx

$xTy \quad yTz$

$x + y = 0$

$y + z = 0$

$x - z = 0$

6.4.2 a) $R_1 \circ R_2 = R \times R$