

PG-43. Jaynam Modi. Tutorial 3.

1. a. $(3x-2)^{10}$.

if it is of the form $(ax+b)^n$

hence,

$$\text{1st term} = {}^nC_3 (ax)^{n-3} b^3$$

$$= {}^{10}C_3 (3x)^7 (-2)^3$$

$$= \frac{10 \times 9 \times 8}{3 \times 2 \times 1} (3^7) (-8) x^7$$

$$= -120 (3^7) (8) x^7$$

$$\text{or } - {}^{10}C_3 (3^7) (8) x^7$$

b. $(x^2 - 2y)^6$

it is of the form $(x^a - by)^n$

$$\text{hence, term} = {}^nC_r (x^2)^{n-r} (-2y)^r$$

$$\text{hence, } n-r=3 \quad \& \quad r=3$$

$$\text{thus, } n=6 \quad \& \quad r=3$$

i.e. the term is

$${}^6C_3 (x^2)^3 (zy)^3$$

$$= {}^6C_3 (x^6) (-8)(y)^3$$

$$= -8 \cdot {}^6C_3 (x^6 y^3)$$

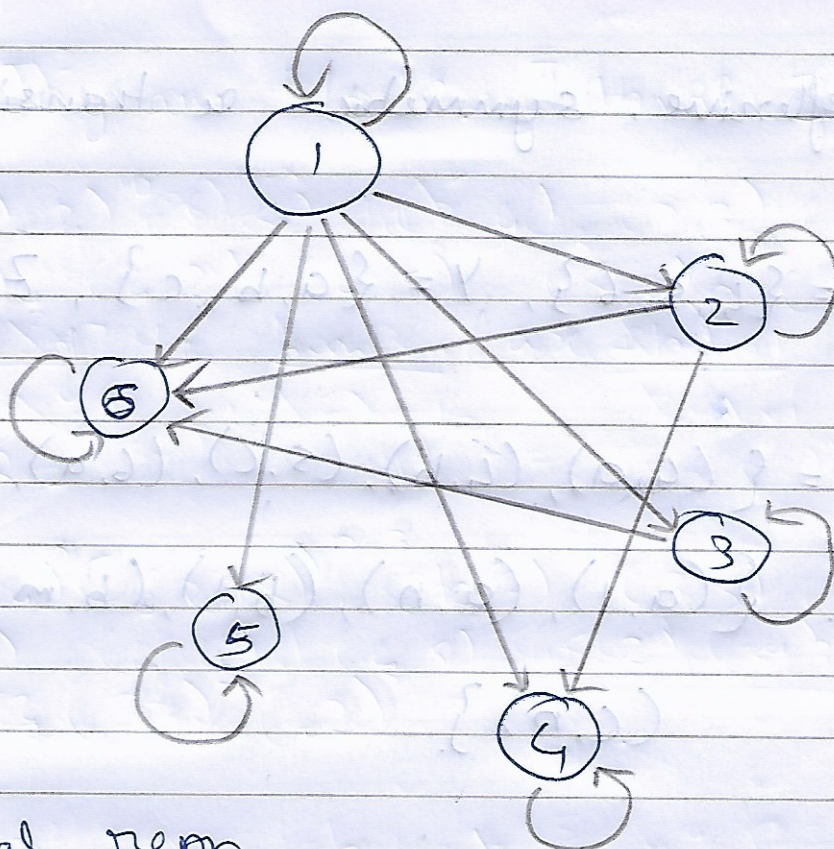
thus the coefficient of $x^6 y^3$ is $-8 {}^6C_3$.

$$2. S = \{1, 2, 3, 4, 5, 6\}$$

b	R	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

Tabular repr.

a.



graphical repr.

$$3. R = \{x+3, x+2\} : x \in \{0, 1, 2, 3, 4, 5\}$$

$$\text{Thus, } R = \{(3, 2), (4, 3), (5, 4), (6, 5), (7, 6), (8, 7)\}$$

$$\text{hence, Domain} = \{3, 4, 5, 6, 7, 8\}$$

$$\text{Range} = \{2, 3, 4, 5, 6, 7\}$$

4. a. not reflexive, not symmetric, transitive.

b. reflexive, symmetric, transitive.

C reflexive, symmetric & transitive.

S. $X = \{4, 5, 6\}$, $Y = \{a, b, c\}$, $Z = \{1, m, n\}$

$$R_1 = \{(4, a), (4, b), (5, c), (6, a), (6, c)\}$$

$$R_2 = \{(a, 1), (a, n), (b, 1), (b, m), (c, 1), (c, m), (c, n)\}$$

$$R_1 \circ R_2 = \{(4, 1), (4, n), \cancel{(4, m)}, (5, 1), (5, m), (5, n), (6, 1), (6, n), (6, m)\}$$

$$R_1 \circ R_1^{-1} :$$

$$R_1^{-1} = \{(a, 4), (b, 4), (c, 5), (a, 6), (c, 6)\}$$

$$R_1 \circ R_1^{-1} = \{(4, 4), (4, 6), \cancel{(4, 4)}, (5, 5), (5, 6), (6, 4), (6, 6), \cancel{(6, 5)}\}$$

6. we know that consecutive numbers, (such as 3, 4), have no common factors,

thus, let our pigeonholes be:

$$\{1, 2\}, \{3, 4\}, \dots, \{2n-1, 2n\}.$$

here, our pigeons are the $n+1$ numbers we are choosing from the given set,

by principle, two of our $n+1$ numbers will be in the same pigeonhole and since the sets have pairs of consecutive numbers, the pigeons will be a pair of consecutive numbers, i.e. we'll have a pair with no common factors.

7. here, we have,

$$k = 5 \text{ \& } r = 6. \quad N = ?$$

we know that $\lceil N/5 \rceil = 6$.

we can find the smallest value of

Using the equation $N = k(r-1) + 1$.

Substituting k \& r , we get

$$N = 5(5) + 1 = \underline{26} \quad \text{hence, there should}$$

be atleast 26 students