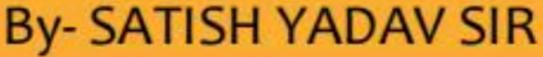
CS & IT





Lecture No. 07







01 Basics of relations

02 Types of relations

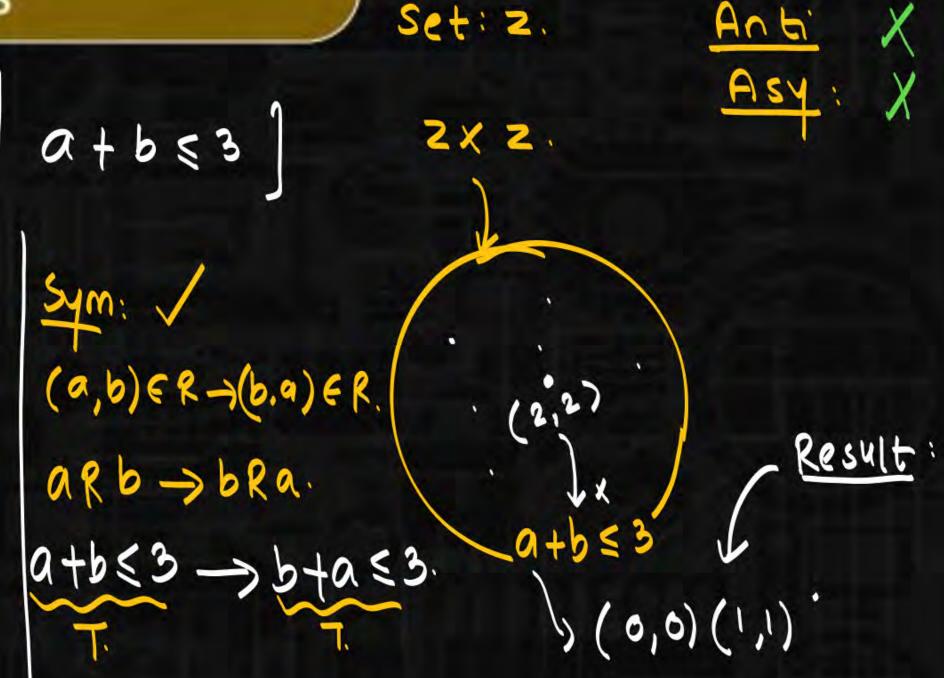
03 Number Of relations



Results
$$R = \{(11)(22)(33)\}$$
 $R = \{(35)|_{a=6}$



Ref.
$$\alpha Ra$$
.
 $x \quad \alpha + \alpha \leq 3$
 $\alpha \leq 3$





$$2 \times 2$$

(0,0), (0,1)

(-1,0), (2,2)

Anti X

Asy X

(1,2), (2,1), (0,3), (3,0)...



$$R_2 = \{ (a, b) | a = b + 2 \}$$

Ref:
$$aRa$$

$$a=a+1$$

$$x$$

$$a=b+1 \rightarrow b=a+1$$

$$(a,1) \rightarrow 1 \neq 2+1$$

$$a=2b=1$$





$$P(A) \times P(A)$$
: { $(\emptyset, \emptyset) (\emptyset, \{1\})$ } $(\{1\}, \{2\})$ } $(\{1\}, \{12\})$ }



$$Asy: X$$

$$(a,b) \in R \rightarrow (b,a) \notin R.$$

$$arb \rightarrow b \not = a.$$

$$ARB \rightarrow B \not = A$$

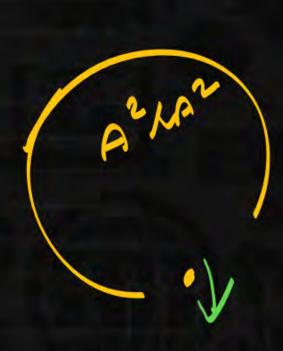
$$\{1|R|1| \rightarrow \{1|2/3|1\}$$

$$\{1|C|1| \rightarrow \{1|2/3|1\}$$



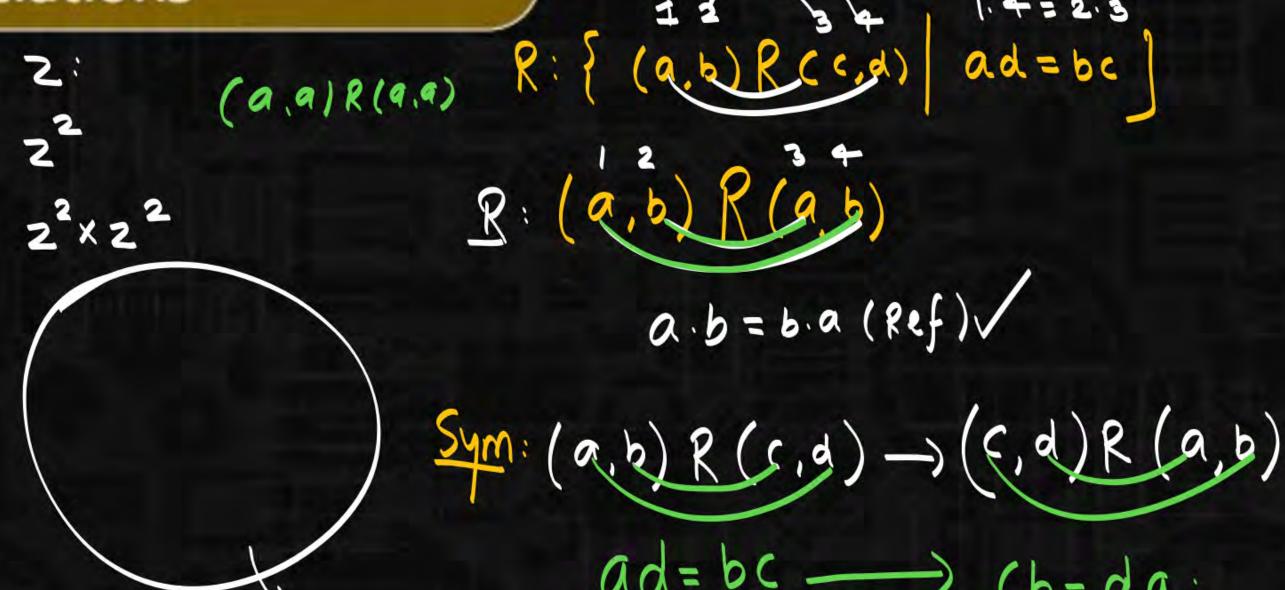


$$A^{2}=\left\{ (1,1)(1,2)(2,1)(2,2) \right\} A^{2}=\left\{ (11)(12)(21)(22) \right\}$$



$$A^{2} \times A^{2} : \left\{ \begin{pmatrix} a & b & c & d \\ (1,1) & (1,1) \end{pmatrix} \right\} \begin{pmatrix} (1,1) & (1,2) \\ (1,1) & (2,1) \end{pmatrix}$$







(a,b) R(a,b) /



$$1-4=2-3$$
 $P-9=9-9$
 $P-9=9-9$

$$\frac{Sym}{(R.9)R(R.5)} \rightarrow \frac{1.5)R(R.9)}{(R.9)R(R.5)} \rightarrow \frac{1.4}{(R.5)R(R.9)}$$

$$1-4=2-3-1-4=2-3.$$

$$P-S=9-R$$

$$-(9-R)=-(P-S)$$

$$9-R=7-S$$



Transitive.

$$\left\{ (a,b)\in R \wedge (b,c)\in R \rightarrow (a,c)\in R. \right\}$$

$$R = \{ \}$$

$$(a,b) \in R \land (b,c) \in R \rightarrow (a,c) \in R$$

$$f \qquad f \qquad \downarrow$$

$$T \qquad \downarrow$$

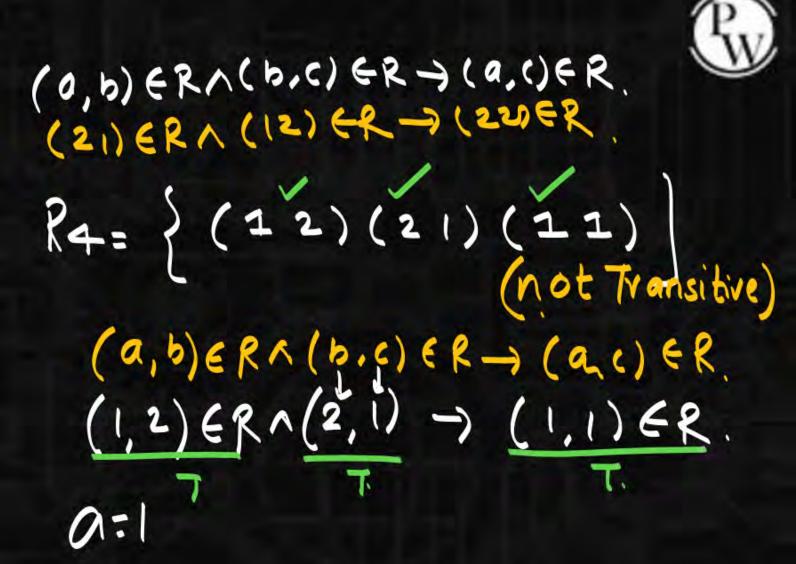
$$R_2 = \left\{ (2,1) \right\}$$

$$(a,b) \in R \land (b,c) \in R \rightarrow (a,c) \in R.$$

$$(2,1) \in R \land f$$

$$T$$

$$R_{3} = \{(12)\} / \{(a,b) \in R \land (b,c) \in R \rightarrow (a,c) \in R, \\ (1,2) \in R \land F \\ 0 = 1 \qquad f \\ b = 2 \qquad T$$



6:2



$$R = \{1, 2, 3\}$$

$$R : \{(1,2)(2,3)(1,3)$$

$$(1,1)(2,2)$$

$$(3,1)$$

$$\begin{array}{c} R' \\ 1 \rightarrow \{(1,1)(1,2)(1,3) \\ 2 \rightarrow (2,2)(2,3) \\ (2,1) \\ 3 \rightarrow (3,1)(3,2)(3,3) \\ R' \text{ then } R \text{ is Transitive.} \end{array}$$

Relations A= \ 1.2,5,4

$$\begin{cases} (1,1)(2,1)(2,2)(2,3) \\ (2,4)(3,1)(3,4) \end{cases}$$

$$(3,2)(3,3)(3,4)$$

$$(1,1) \qquad (2,2)(2,3)(2,4)(2,1)$$



$$\frac{1}{2} \left(\frac{1}{2} \right)^{\frac{1}{4}} + \frac{1}{3} \left(\frac{3}{3}, \frac{3}{3} \right) \left(\frac{3}{3}, \frac{4}{3} \right) \left(\frac{3}{3}, \frac{1}{2} \right) \left(\frac{3}{3}, \frac{2}{3} \right)$$



