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DGAD / 47

DSGT

① What are the terms a_0, a_1, a_2 and a_3 of the Sequence $[a_n]$ where a_n equals.

ⓐ $(-2)^n \longrightarrow a_0 = (-2)^0 = 1$, $a_1 = (-2)^1 = -2$,
$a_2 = (-2)^2 = 4$, $a_3 = (-2)^3 = -8$.

$\therefore$ First 4 terms are $1, -2, 4, -8$.

ⓑ 3
$\rightarrow$ First four terms are $3, 3, 3, 3$.

ⓒ $7 + 4^n \longrightarrow a_0 = 7 + 4^0 = 8$, $a_1 = 7 + 4^1 = 11$,
$a_2 = 7 + 4^2 = 23$, $a_3 = 7 + 4^3 = 71$.

$\therefore$ First 4 terms are $8, 11, 23, 71$.

ⓓ $2^n + (-2)^n \rightarrow a_0 = 2^0 + (-2)^0 = 2$, $a_1 = 2^1 + (-2)^1 = 0$,
$a_2 = 2^2 + (-2)^2 = 8$, $a_3 = 2^3 + (-2)^3 = 0$.

$\therefore$ First 4 terms are $2, 0, 8, 0$.

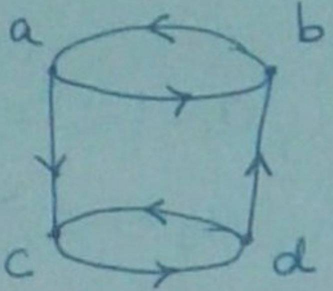
② Let R be the relation on the set $\{0, 1, 2, 3\}$ containing the ordered pair. $(0,1), (1,1), (1,2), (2,0), (2,2)$ & $(3,0)$.

ⓐ reflexive closure of R. $\rightarrow$ $(0,0)$ & $(3,3)$ are the reflexive closures of R

ⓑ Symmetric closure $\rightarrow$ $\forall (a,b) \rightarrow (b,a)$
$\therefore$ $(1,0), (2,1), (0,3), (0,2)$ are the symmetric closures of R.

Q.

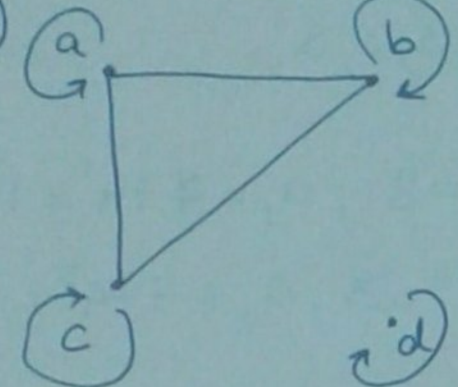
i)



Transitive closures are:
(b,b), (b,c), (c,b), (a,a),
(d,d), (a,d), (d,a), (c,c).

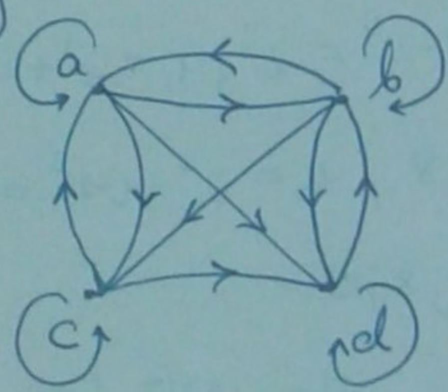
Reflexive closures are: (a,a), (b,b), (c,c), (d,d).

ii)



Reflexive closure are
(b,b), (c,c), (d,d).

iii)



Transitive closure is
(a,a), (b,b), (c,c), (d,d),
(b,c), (c,d).

Reflexive closure is
(a,a), (b,b), (c,c), (d,d).

Q. Let R be the relation {(1,2), (1,3), (2,3), (2,4), (3,1)}
& S be the relation {(2,1), (3,1), (3,2), (4,2)}
Find ~~S~~ SoR

→ SoR = {(1,1), (2,1), (2,2), (1,2)}

Q ① $\{1,2\}, \{2,3,4\}, \{4,5,6\}$

→ ∵ Its union is S but intersection is not null

Hence, it is not a ~~po~~ partition of sets.

② $\{1\}, \{2,3\}, \{4,5\}, \{6\}$

→ ∵ Its union is S and intersection is null

∴ It is a partition of sets.

③ $\{2,4,6\}, \{1,3,5\}$

→ ∵ Its union is S and intersection is null,

∴ It is a partition of sets.

④ $\{1,4,5\}, \{2,6\}$

∵ Its union is not S, thus it is not a partition of sets

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

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

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

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

③ $R_1 - R_2 = \{(\phi)\}$

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

Q. Let R_1 & R_2 be the relations on a set A represents the matrices.

$$M_{R_1} = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} \quad \& \quad M_{R_2} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

① $R_1 \cup R_2 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

② $R_1 \cap R_2 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

③ $R_2 \circ R_1 = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$

④ $R_1 \circ R_2 = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$

⑤ $R_1 \oplus R_2 = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

Q. Let R be the relation on the set {1, 2, 3, 4, 5} containing the ordered pair (1, 1), (1, 2), (1, 3), (2, 3), (3, 4), (3, 1), (3, 4), (3, 5), (4, 2), (4, 5), (5, 1) & (5, 4).

Find

a) $$R = \begin{array}{c|c} & \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} & \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 \end{bmatrix} \end{array}$$

$$\rightarrow R^2 = R \circ R = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

$$R^2 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

Similarly,

$$\therefore R^3 = R^4 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$