lec # 15

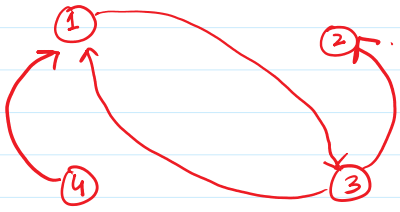
Representing Relations using Graphs.

1- O →

2- Set of Vertices. Set of Edges.
V E.

Graph = (V, E).

V = {1, 2, 3, 4}. E = {(1, 3), (4, 1), (3, 1), (3, 2)}.

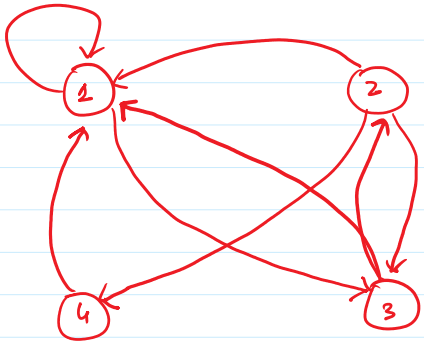


R = {(a, b) | ——}. A.

V = ? V = A
E = ? E = R.

Ex 8
P480

R = {(1,1), (1,3), (2,1), (2,3), (2,4), (3,1), (3,2), (4,1)}. A = {1, 2, 3, 4}.



How to test properties given Relation in Graph.

Reflexive :-

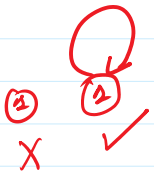
∀a (a, a) ∈ R. (1,1)

→ loop.

Examples:

$A = V = \{\}$ $E = \{\}$.

R



$E = \{(1,1)\}$. = R.

$A \times A$

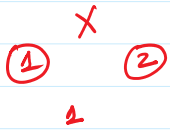
$0 \times 0 = 0$.

$2^{|A| \times |A|}$

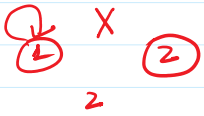
$= 2^{0 \times 0} = 2^0$

$= 1$.

$A = \{1, 2\}$.



1



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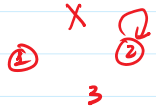

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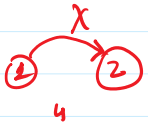

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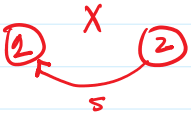

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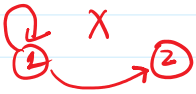

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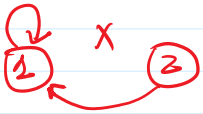

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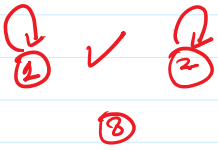

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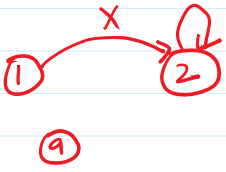

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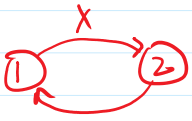

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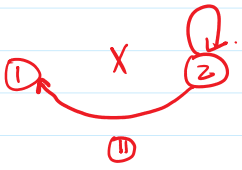

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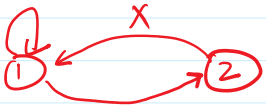

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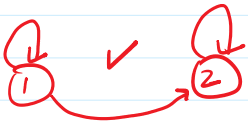

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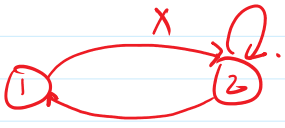

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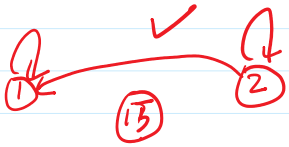

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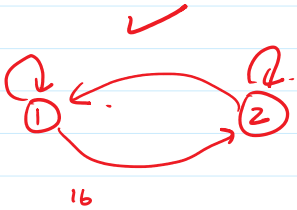
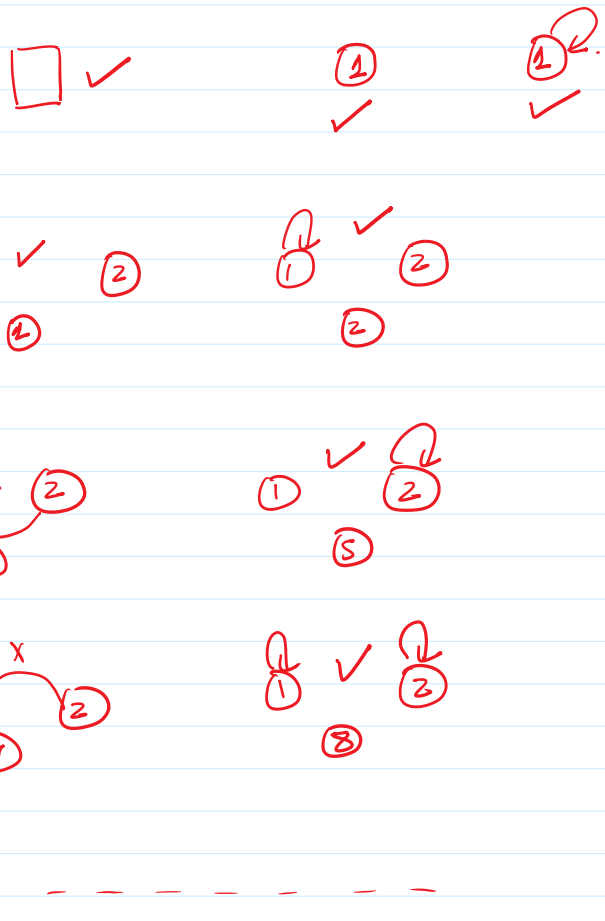
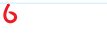


16

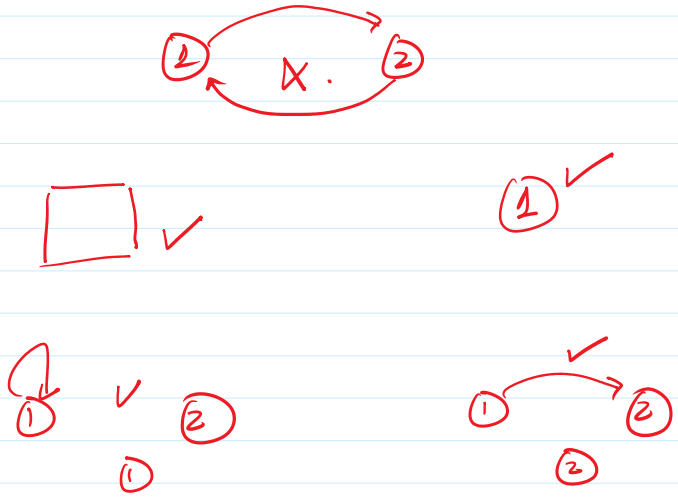
Symmetric $\forall a,b \in A$ if $(a,b) \in R \rightarrow (b,a) \in R$.

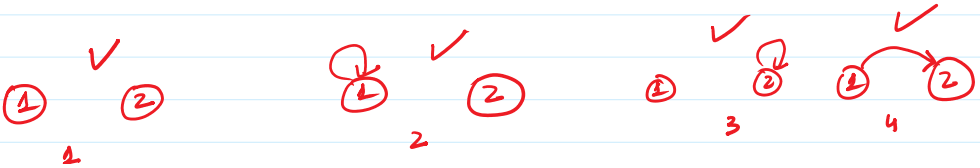
Symmetric $\forall a,b \in$

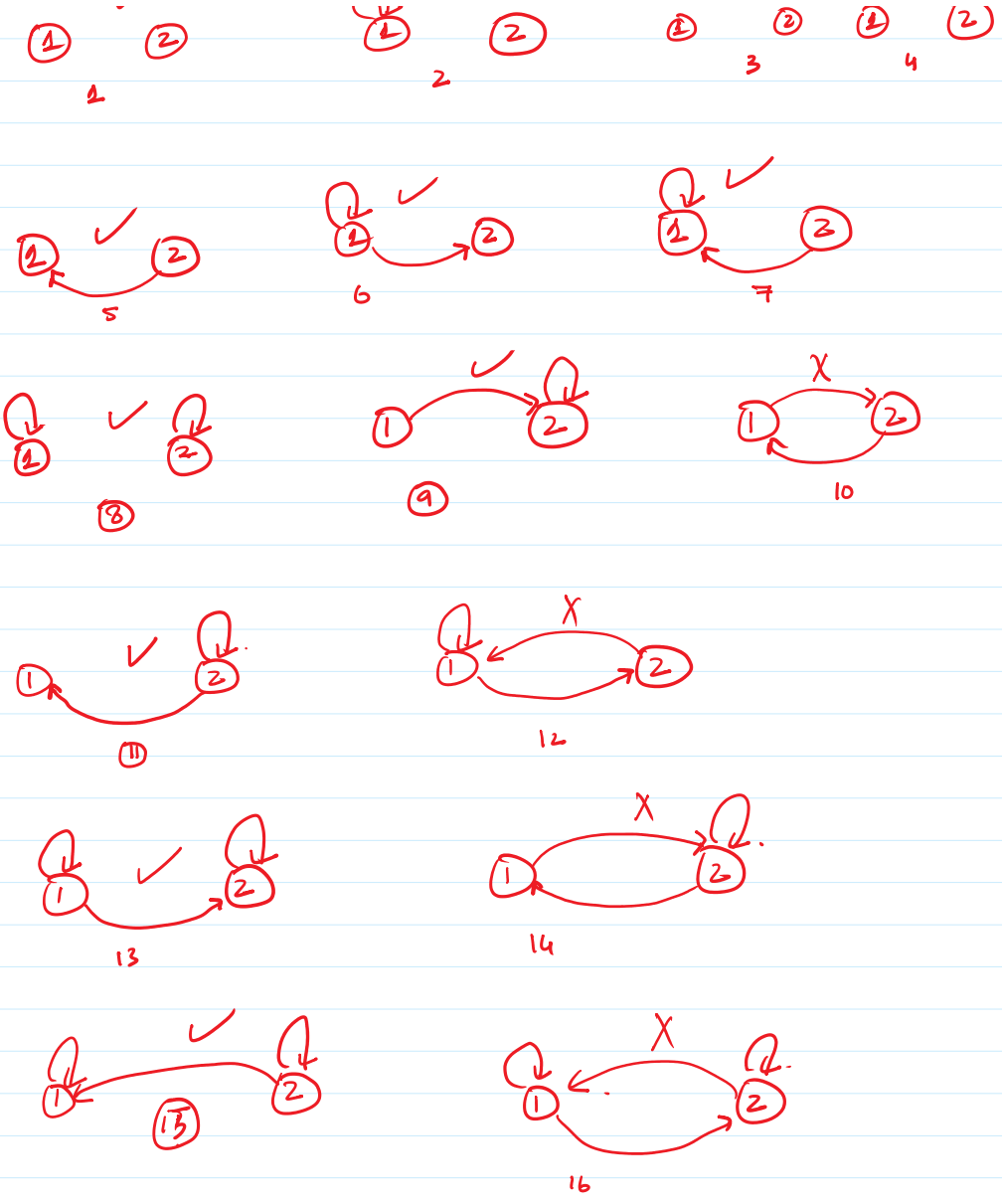




Anti Symmetric $\forall a,b \in A$ if $(a,b) \in R \wedge (b,a) \in R \rightarrow a = b$.







Ex 9
12481

$R = \{(a,b) \mid a > b\}$ $A = \{1, 2, 3, \ldots 100\}$.

How many non-zero entries in the Matrix Corresponding to R.

	1	2	3	----	100
1	0	0	0	----	0
2	1	0	0	----	0
	1	1	0	----	
	1	1	1	----	0
				----	0
				----	0
				----	0
100	1	----		1 .	0

(1,1).

Size = 100 x 100
= 10,000.

Zero.

$10,000 - 100 = 9,900 = 4450$

Zero.

$10{,}000 - 100 = \frac{9{,}900}{2} = 4450$

Non-zero = $10{,}000 - 100 - 4450 = ?$

Quiz # 3

$$M_R = \begin{array}{c|ccc} & a & b & c \\ \hline a & 0 & 1 & 0 \\ b & 0 & 0 & 1 \\ c & 1 & 0 & 0 \end{array}$$

a) Determine the corresponding Graph.

b) Determine $\overline{R}$

c) Determine R^{-1}