Subject   Date 24/2/15

(Lecture 19,20)

Chp no 7 - Relations

A relation from A to B is a subset of $A \times B$.

let $A = \{1,2,3,4\}$

So

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

Now its subsets are relations.

e.g $R_1 = \{(a,b) \mid a \leq b\} = \{(1,1),(1,2),(1,3),(1,4),(2,2),(2,3),(2,4),(3,3),(3,4),(4,4)\}$

$R_2 = \{(a,b) \mid a > b\} = \{(2,1),(3,1),(3,2),(4,1),(4,2),(4,3)\}$

$R_3 = \{(a,b) \mid a = b\} = \{(1,1),(2,2),(3,3),(4,4)\}$

$R_4 = \{(a,b) \mid a = b+1\} = \{(2,1),(3,2),(4,3)\}$

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Types of Relations

Reflexive:-

A relation R on a set A is called reflexive if $(a,a) \in R$ $(\forall a \in a)$ where the universe of discourse is set of all elements in A.

Symmetric:-

A relation R on a set A is called Symmetric if $(b,a) \in R$ where $(a,b) \in R$ for all $(a,b) \in A$.

Anti- Symmetric:-

A relation R on a set A such that for all $a,b \in A$, if $a,b \in R$ and $b,a \in R$ Then $a=b$ is called Anti- Symmetric.

Transitive:-

A relation R on a set A is called Transitive if where ever $(a,b) \in R$ and $(b,c) \in R$ Then $(a,c) \in R$ for $(a,b,c) \in A$.

In common words

→ In Symmetric, There should be oppositive values.

→ In Anti-Symmetric, There should not be opposite.

Example of Transitive Relation:-

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

write down the pairs so that the last value of first pair and first value of second pair should be same.

$(1,1)\ (1,2) = (1,2) \in R$

$(1,2)\ (2,1) = (1,1) \in R$

$(1,2)\ (2,2) = (1,2) \in R$

$(2,1)\ (1,1) = (2,1) \in R$

$(2,1)\ (1,2) = (2,2) \in R$

$(2,2)\ (2,1) = (2,1) \in R$

$(3,4)\ (4,1) = (3,1) \notin R$

The pair we got in result should belongs to given relation.

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Question:-

Check all four types of relations for given?

(a,b) = a is taller than b

Reflexive Check:-

(a,a) = a is taller than a - False

(not reflexive)

Symmetric Check:-

(a,b) = a is taller than b

(b,a) = b is taller than a - False

(Not Symmetric)

Anti-Symmetric Check:-

(a,b) and (b,a) should equal - False

(Not Anti-Symmetric)

Transitive Check:-

(a,b), (b,c) $\longrightarrow$ (a,c) True

(Transitive)