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Scribed Notes - Lecture 11

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Relations :

- A relation defines the relationship between sets of values of ordered pairs.
- Relation is a subset of cartesian products. Cartesian products have N elements.
- No. of subset : 2^n

Types of relations on a set.

1) Reflexive
2) IR Reflexive
3) Symmetric
4) Anti Symmetric
5) Transitive
6) Equivalence
7) Partial Order
8) Total Order(Special case of partial order)

1)Reflexive :

A reflexive relation is the one in which every element maps to itself. For example, consider a set A = {1, 2,}. Now, the reflexive relation will be R = {(1, 1), (2, 2), (1, 2), (2, 1)}. Hence, a relation is reflexive .

Example:

(a, a) ∈ R ∀ a ∈ A

No. of Reflexive Relation : 2^(n^2-n)

2)IRReflexive :

If any element is not related to itself, then it is an irreflexive relation.
Not any of the Identical elements should be present.
For example, consider a set A = {1, 2,}. Now, the reflexive relation will be R= { (1, 2), (2, 1)}

(a, a) ∉ R ∀ a ∈ A

No. of IRReflexive Relation : 2^(n^2-n)

Other(Neither Reflexive nor Irreflexive :
If Any of the Identical elements is present but not all identical elements are present then it is neither reflexive nor irreflexive.
For example, consider a set A = {1, 2,}. Now, the reflexive relation will be R= { (1,1),(1, 2), (2, 1)}

No. of IRReflexive Relation : (2^(n^2-n))*(2^n-(2))

Symmetric :

In a symmetric relation, if a=b is true then b=a is also true. In other words, a relation R is symmetric only if (b, a) ∈ R is true when (a,b) ∈ R.

An example of symmetric relation will be R = {(1, 2), (2, 1)} for a set A = {1, 2}. So, for a symmetric relation,

aRb ⇒ bRa, ∀ a, b ∈ A

No. of Symmetric Relation: **2^(nC2+n)=2^((n^2+n)/2)**