Date:

III Meets and Joins

certain elements of a pre-ordered set to stand out due to some special characterization. This can be either relative or absolute.

We discuss two such elements : join and meet

join: least upper bound (supremum)

meet: greatest lower bound (infimum)

Def: let $(P, \leq)$ be pre order and let $A \subseteq P$ be a subset, We say that an element $p \in P$ is a <u>meet of A</u> if:

a) for all $a \in A$, we have $p \leq a$

b) for all ~~$a \in A$~~ q such that $q \leq a$, $(a \in A)$ we have $q \leq p$

meet of two element a and $b \in P$ is denoted by $a \wedge b$ and meet of subset A is denoted p by $p = \wedge A$

~~join of A~~ p is a <u>join of A</u> if:

a) ~~to~~ $\forall a \in A$ we have $a \leq p$

b) $\forall q$ such that $a \leq q$, $\forall a \in A$ we have $p \leq q$

~~$p = \vee A$~~ for any subset A, p is (join) is denoted like this : $p = \vee A$

- two joins or meets p and q mean $p \cong q$, i.e., $p \leq q$ and $q \leq p$ (u and q may not be equal but in this context one can be used instead of other, i.e., equivalent in this context)
- Meets ~~and~~ or joins may not exist
- Multiple meets or joins may exist.
- Suppose $(P, \leq)$ is a preorder and $A \subseteq B \subseteq P$ are subsets that have meets. Then:

$$\wedge B \leq \wedge A$$
$$\vee A \leq \vee B$$

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- What are joins and meet n:

i) set:

join → union

meet → intersection

ii) Booleans:

join → OR

meet → AND

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