T9 G2 17 Feb 2022

17 February 2022 11:18

Is (S,R) a poset if S is a set of all people in the world and $(a,b) \in R$, where a and b are people if

i) a weighs more than b

$(a,a) \in R \Rightarrow$ a weighs more than a

not Reflexive

Not a poset

$\preccurlyeq \to$ Relation

Def :- The elements a and b of a poset (S, R) are **Comparable** if either aRb or bRa

When a and b are elements of S such that neither aRb or bRa are called **incomparable**

$(Z^+, |)$ 3 and 9 are Comparable to each other

$\because 3 | 9$

$2 | 4$

$3 \nmid 4$

5 and 7 $5 \nmid 7$ and $7 \nmid 5$ so

$\to$ incomparable.

Def :- If (S,R) is a poset and every two elements of S are Comparable. S is called a **totally ordered** or **Linearly ordered set**.

The poset $(Z, \leq)$ is totally ordered

$\ldots -5 < -4 < -3 < -2 \leq -1 \leq 0 \leq 1 \leq 2 \leq 3 \leq 4 \leq 5 \ldots$

$\ldots\ldots -5 \le -4 \le -3 \le -2 \le -1 \le 0 \le 1 \le 2 \le 3 \le 4 \le 5 \ldots\ldots$

A totally ordered set is also called a chain.

Hasse Diagram :→

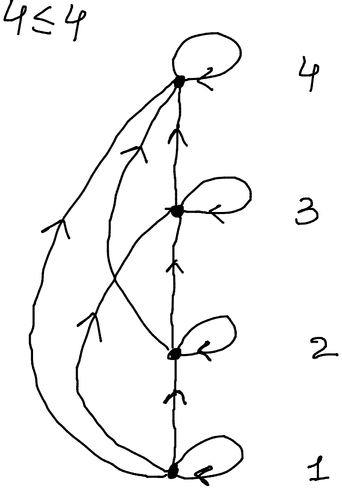
$\{1, 2, 3, 4\}, \le$ ✓

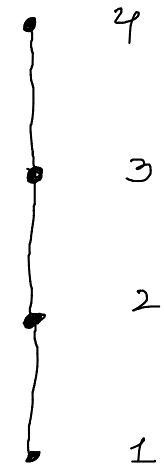
$1 \le 1$ $\quad 2 \le 2$ $\quad 3 \le 3$ $\quad 4 \le 4$

$1 \le 2$ $\quad 2 \le 3$ $\quad 3 \le 4$

$1 \le 3$ $\quad 2 \le 4$

$1 \le 4$



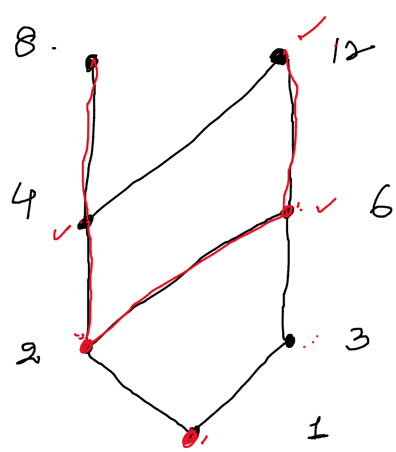


Reflexive ✓ aRb

antisymmetric

Transitive ✓

$S = \{1, 2, 3, 4, 6, 8, 12\}, \; | \to$ divisibility



Hassé Diagram