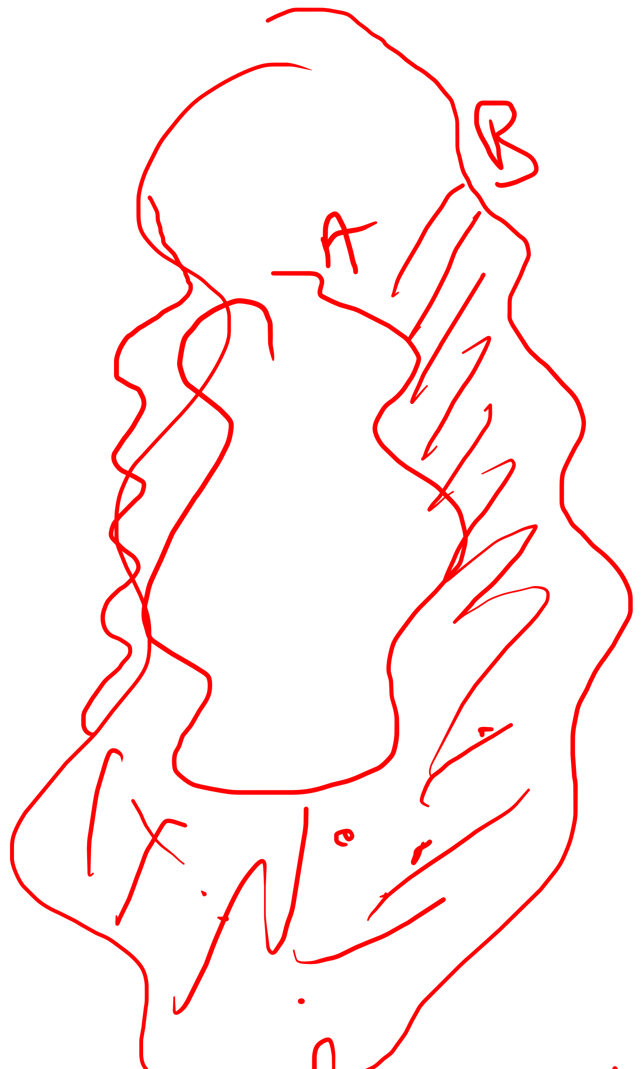
$A = \{1, 2, 3\}$, $(P(A), \subseteq) \to$



$(P(A), \subseteq)$ is a poset under '$\subseteq$' relation

$A = \mathbb{N}$, '$\leq$' $\to$ $\cancel{a \mid b \Rightarrow a \leq b}$

$a \leq b \Leftrightarrow a \mid b$.

$(A, \leq)$ is a poset where '$\leq$' is defined by $a \leq b \Leftrightarrow a \mid b$.

$A = \mathbb{Z}$, $a \not| b \not\Leftrightarrow$ $a \le b \Leftrightarrow a | b$.

<u>Soln:</u> 0 does not divide 0 $\Rightarrow$ '$\le$' is not reflexive

$\Rightarrow (A, \le)$ is not poset.

$A = \mathbb{Z} \setminus \{0\}$ $a \le b \Leftrightarrow a | b$

$a = 2$, $b = -2$ $\quad 2 | -2$ as well as $-2 | 2$

but $2 \ne -2$

$\Rightarrow$ '$\le$' is not anti-symmetric.

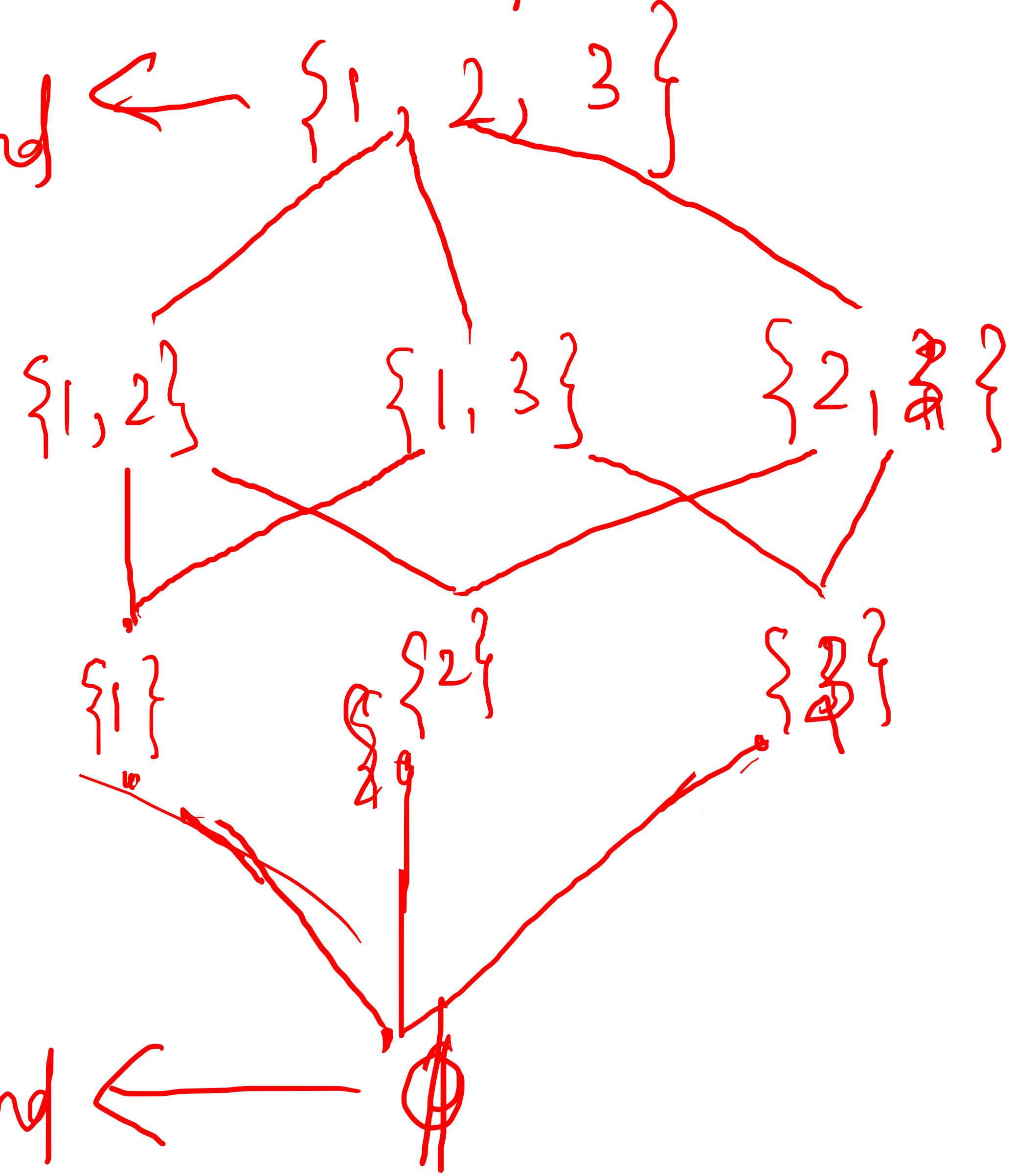
Hesse Diagram

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

$(P(A), \subseteq)$ – poset

$P(A) = \{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$

least upper bound ← $\{1, 2, 3\}$



greatest lower bound ← ϕ

$A = \{a, b\}$, '$\subseteq$' is def

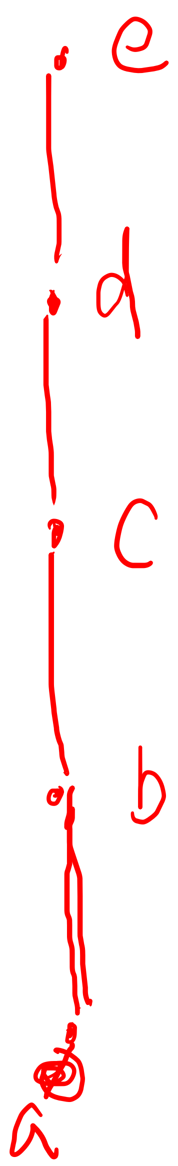
Consider $(P(A), \subseteq) \longrightarrow$ is poset

Draw Hasse diagram:

$$\begin{tikzcd}
 & \{a, b\} \arrow[dl, no head] \arrow[dr, no head] & \\
\{a\} \arrow[dr, no head] & & \{b\} \arrow[dl, no head] \\
 & \phi &
\end{tikzcd}$$

$$R = \begin{array}{c|ccccc} & a & b & c & d & e \\ \hline a & 1 & 1 & 1 & 1 & 1 \\ b & 0 & 1 & 1 & 1 & 1 \\ c & 0 & 0 & 1 & 1 & 1 \\ d & 0 & 0 & 0 & 1 & 1 \\ e & 0 & 0 & 0 & 0 & 1 \end{array}$$

→ symmetric



Totally ordered set.

If any two ~~of~~ elements under a partial ordering relation are comparable, then that set is called totally ordered set.

$A = \{ \underline{a_1 \leq a_2 \leq \dots a_n \leq \dots} \; \underline{b_1 \leq b_2 \leq \dots \dots} \, b_n \leq \dots \}$

$x_1 \leq x_2 \leq x_3 \leq x_4 \leq \dots$