Tutorial 1 :

1.) Solution : The proof does not assure that all the identity elements pairs of type (a,a) are present in R.

3.) Solution :- Considering all the diagonal relations we will have $2^{n(n-1)}$ reflexive relations.

eg :- $A = \{a, b, c\}$

$$\begin{bmatrix} (a,a) & (a,b) & (a,c) \\ (b,a) & (b,b) & (b,c) \\ (c,a) & (c,b) & (c,c) \end{bmatrix}$$

Now, by pairing symmetrical sets i.e (a,b) & (b,a) we will have $2^{\frac{n(n-1)}{2}}$ symmetrical and reflexive relations.

6.) For a Partial order set, It should satisfy the conditions of reflexivity, ~~smm~~ anti-symmetric and transitive.

The set $A = [0,2)$ of real numbers on operation $\leq$ is.

① Reflexive :- Since every element is equal to itself i.e $0 \leq 0$, $0.1 \leq 0.1$.

② Anti-Symmetric :- Symmetric elements are not present. if $(0.1 \leq 0.2)$, then $(0.2 \leq 0.1)$ will not be in the set.

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3) transitive :- if $a \le b$ & $b \le c$ then $a \le c$

Hence, the set $A = [0,2)$ of real numbers with the operator $\le$ is a poset or partial order.

Also, every pair of elements will have a meet and join hence the poset is a lattice.
($\because$ A poset is a lattice if every pair of elements have a meet and a join.)

Q.2 :- Proof by Induction:

Basic Step :- $R^1 = R$ is symmetric which is ~~true~~ true.

Inductive Step :- Assume that R^n is symmetric.

To Prove :- $R^{(n+1)}$ is symmetric.
$R^{(n+1)}$ is symmetric if for all $(x,y) \in R^{(n+1)}$, we have $(y,x) \in R^{(n+1)}$ as well.

$=$ Assume that $(x,y) \in R^{(n+1)}$.
Now, $R^{n+1} = R^n \circ R = R \circ R^n$.

We know that if $(x,y) \in R \circ R^n$, then by the definition of composition there exists a $z \in A$ such that $x R z$ and $z R^n y$ i.e $(x,z) \in R$ and $(z,y) \in R^n$.
And we also know that R and R^n are symmetric, which implies that $(z,x) \in R$ and also $(y,z) \in R^n$.
Therefore, by definition of composition $(y,x) \in R \circ R^n$
i.e $(y,x) \in R^{n+1}$

Hence Proved.

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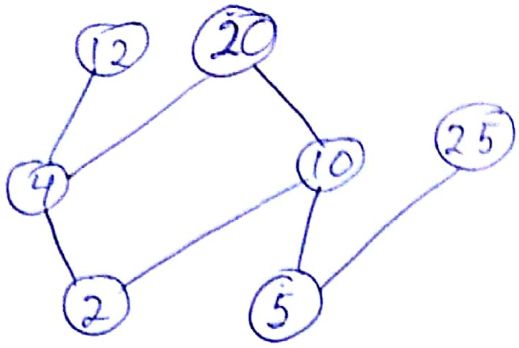
Sol^n

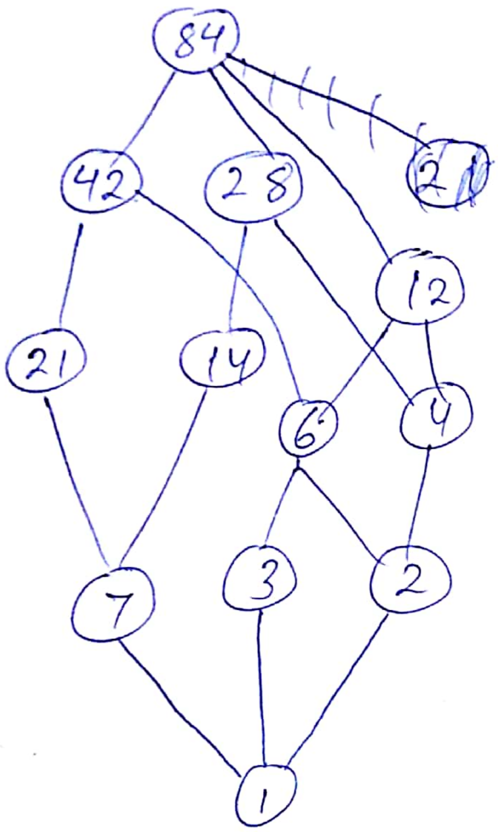
Q.4:



maximal :- 25, 20, 12

minimal :- 2, 5

Q. 5:



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(8) (7.) $(p, q) R (r, s)$ iff $p - s = q - r$

Test for Reflexive:

$(p, q) R (p, q)$

$\Rightarrow p - q = q - p$ (not possible)

Hence it is not reflexive.

Test for Symmetric:

$(p, q) R (r, s) \rightarrow (r, s) R (p, q)$

$p - s = q - r$

$r - q = s - p$

$s - p = r - q$

$r - q = s - p$

It is symmetric.

Option (c)

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