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Discrete Structures

Term - Test 2

Solutions :

→ 3) Suppose $P(n) = 2+5+8+ \dots (3n-1) = \frac{n(3n+1)}{2}$

Now, let us check for $n=1$,

$P(1) = \frac{1(4)}{2} = 2$

$\therefore P(n)$ is true for $n=1$.

Now, let $P(n)$ is true for $n=k$, then we have to prove that $P(k+1)$ is true.

$P(k) = 2+5+8+11+ \dots (3k-1) = \frac{1}{2} k(3k+1)$ — (i)

Therefore,

$2+5+8+11+ \dots (3k-1) + (3k+2)$

Then, substituting the value of $P(k)$ from equation (i),

$= \frac{1}{2} \times k(3k+1) + (3k+2)$ by using equation (i)

$= \left[\frac{3k^2+k+2(3k+2)}{2}\right]$

$= \frac{3k^2+k+6k+4}{2}$

$= \frac{3k^2+7k+4}{2}$

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$$= \frac{3k^2 + 4k + 3k + 4}{2}$$

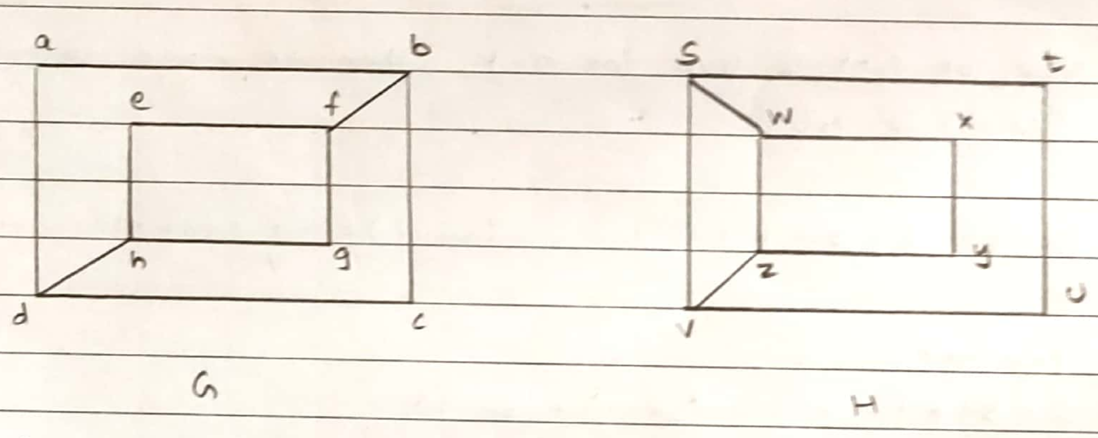
$$= \frac{3k(k+1) + 4(k+1)}{2}$$

$$= \frac{(k+1)(3k+4)}{2}$$

$\therefore P(n)$ is true for $n = k+1$

Thus, $P(n)$ is true for all $n \in N$

→ 2)



We first note the following:

1) Both the graphs have the same number of vertices viz. 8 and the same number of edges 10.

2) In G there are four vertices with degree 3 and in H also there are four vertices with degree 3.

3) But adjoncy is not preserved in the two graphs. In G vertex with 3 edges is adjacent to only one vertex with 3 edges (f and b or d and h). But in H a vertex with 3 edges in adjacent to two vertices with edges 3 (s to w and v, w to s and u and so on). Thus adjanancy is not preserved.

4) Hence, G and H are not isomorphic.

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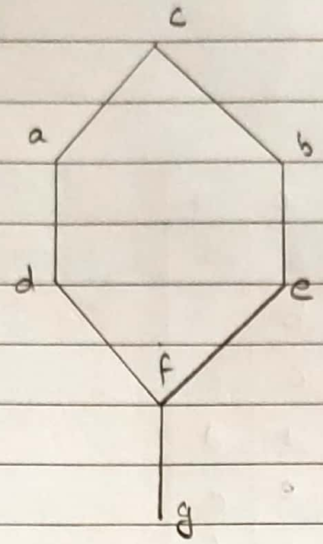
i)



GLB

V	a	b.	c	d	e	f	g
a	a	f	a	d	f	f	g
b	f	b	b	f	e	f	g
c	a	b	c	d	e	f	g
d	d	f	d	d	f	f	g
e	f	e	e	f	e	f	g
f	f	f	f	f	f	f	g
g	g	g	g	g	g	g	g

~~LUB~~

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LUB

$\wedge$	a	b	c	d	e	f	g
a	a	c	c	a	c	a	a
b	c	b	c	c	b	b	b
c	c	c	c	c	c	c	c
d	a	c	c	d	c	d	d
e	c	b	c	c	e	e	e
f	a	b	c	d	e	f	f
g	a	b	c	d	e	f	g

Yes, it is lattice as every pair of elements has a GLB and a LUB.

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