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Q-1A (a) $f(y) = (3y+2)/(y-1)$

let $f(y) = x$,

$x = (3y+2)/(y-1)$

replacing y by x and x by y,

$y = (3x+2)/(x-1)$

$\therefore y(x-1) = (3x+2)$

$\therefore yx - y = 3x+2$

$\therefore yx - 3x = 2+y$

$\therefore x(y-3) = (2+y)$

$\therefore x = \dfrac{(2+y)}{(y-3)}$

$\therefore$ replacing x by y and $f^{-1}(y)$,

$\therefore f^{-1}(y) = \dfrac{(2+y)}{(y-3)}$

(b) $a_n = na_{n-1} + n^2 a_{n-2}$; $n >= 2$; $a_0 = 1$, $a_1 = 1$

here given $a_0 = 1$ and $a_1 = 1$.

for $n = 2$

$\therefore a_2 = 2a_1 + (2)^2 a_0$

$= 2(1) + (2)^2(1)$ ($\because$ as $a_0 = 1$ and $a_1 = 1$)

$= 2 + 4$

$= 6$

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for $n = 3$

$a_3 = 3a_2 + (3)^2 a_1$

$= 3(6) + (3)^2(1)$ [$\because$ as $a_2 = 6$, $a_1 = 1$]

$= 18 + 9$

$= 27$

for $n = 4$

$a_4 = 4a_3 + (4)^2 a_2$

$= 4(27) + (4)^2(6)$ [$\because$ as $a_3 = 27$, $a_2 = 6$]

$= 108 + 96$

$= 204$

for $n = 5$

$a_5 = 5a_4 + (5)^2 a_3$

$= 5(204) + (25) \times (27)$ [$\because$ as $a_4 = 204$, $a_3 = 27$)

$= 1695$

Q-1 (B)

here $a \circ b = a + 2ab + b$

$x \circ 2 \circ 7 = 82$

$\therefore$ for $x \circ 2 = x + 2(x)(2) + (2)$

$= x + 4x + 2$

$= 5x + 2$

let $r = x \circ 2 = 5x + 2$,

for $r \circ 7 = r + 2(r)(7) + (7)$

$= (5x+2) + 2(5x+2)(7) + (7)$

$= 5x + 2 + 70x + 28 + 7$

$= 75x + 37$

here $(x \circ 2 \circ 7) = 82$ is given

$\therefore$ $82 = 75x + 37$

Q-3 A or

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1 B continue

$\therefore 75x = 45$

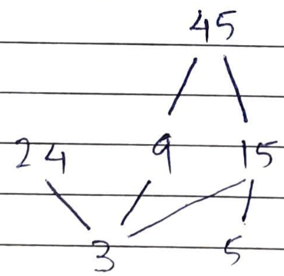
$\therefore x = \cancel{51/75}$ $45/75$

$= 3/5$

Q-2 A. $(\{3, 5, 9, 15, 24, 45\}, /)$

→ hasse diagram:

as, 45 is divisible by 9 and 15,
24 is divisible by 3
9 is divisible by 3.
15 is divisible by 5 and 3.



here maxima = {45}
minima = {3, 5}
greatest element = {45}
least element = {3}

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(Q-2B) (or)

A ~~B~~ or question

({1,2,3,4,5}, |) and ({1,2,4,8,16}, |) are given.

as 2 and 3 has no uppar bounds, in ({1,2,3,4,5}, |) they certainly do not have a least uppar bound. Hence, the first poset is not lattice.

Every two elements of the second poset have ~~both~~ both a least uppar bound and greatest. The least uppar bound of two elements in this poset is the larger of the elements ~~the~~ and the greatest lower bound of two elements is the smaller of the elements,

Hense the second poset is lattice.

Q-2 B.) let number of integers from set of numbers 1-100 that are no divisible by 2,3,5 is AUBUC.

where A is the set of numbers of intigers that are not divisible by 2.

B is " " by 3.

C is " " by 5.

2B continue

→ the numbers divisible by 2 = 50 ($\because$ (100/2)) = n(
the numbers divisible by 3 = 33 ($\because$ ⌊100/3⌋) n(
the numbers divisible by 5 = 20 ($\because$ (100/5)) n(

also, the numbers divisible by 6 (LCM of 2&3)
$n(A \cup B) = 16$ ($\because$ ⌊100/6⌋)
the numbers divisible by 10 (LCM of 2&5)
$n(A \cup C) = 10$ ($\because$ 100/10)
the numbers divisible by 15 (LCM of 3&5)
$n(B \cup C) = 6$ ($\because$ ⌊100/15⌋)

$\therefore$ Total : $A \cup B \cup C$ or
$= n(A) + n(B) + n(C) - n(A \cup B) - n(A \cup C)$
$- n(B \cup C) + n(A \cap B \cap C)$

here, $A \cap B \cap C$ means
the numbers divisible by 30 (LCM of 2,5,3)
= 3

$= 50 + 33 + 20 - 16 - 10 - 6 + 3$
$= 74$

$\therefore$ Ther numbers of integer from set of numbers 1-100 that are not divisible by 2,3,5 are 74

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Q-3
A.

~~a) If I take the day off, it either rains or snows~~

(or question)

~~let us assume that~~
~~"If Randy works hard, then he is a dull boy.~~

let us assume that:

p = "Randy works hard"
q = "Rand is a dull boy"
r = "Randy will get the job".

we can rewrite the given statement (1), (2) and (3)
i.e.

→ Randy works hard.
→ If rand works hard then he is a dull boy
→ If Randy is a dull boy, then he will not get the job.

	Step	Reason
1	p	premise.
2	$p \to q$	premise.
3	$q \to \sim r$	premise.
4	q	modens ponens from (1) and (2.)
5		modens ponens from (3) and (4.)

here we know that modus ponens is

$$\frac{\begin{array}{c} P \to Q \\ P \end{array}}{\therefore Q}$$

Q-3 A or continue.

$\therefore$ here for the 5th statement
as per modus ponens

$$\begin{array}{l} p \rightarrow Q \\ p \\ \hline \therefore Q \end{array}$$

let us ~~we~~ assume that p is q and q is ~r.

$$\begin{array}{ll} \therefore \quad q \rightarrow \sim r & (\text{3rd step}) \\ \quad q & (\text{4th step}) \\ \hline \therefore \sim r & \end{array}$$

~~he~~
→ here ~r means that "Randy will not get the job." and therefore we obtained the implied conclusion.

Q-3 (B) "If 3n+2 is odd then n is odd"

here our aim is to prove "If 3n+2 is odd then n is odd"

→ To derive this conditional we need to assume the antecedent of the conditional. that is we have to assume that ~~if~~ 3n+2 is odd. we want to derive that n is odd. If we can do that then the conditional can be derived.

→ Since we want a proof by contradiction lets assume that what we want to derive. the negation of which is: we will assume that n is even ~~as or odd but~~ hopping to derive a contradiction so we can reject this our (false) assumption. here we have to know that n is either even or odd but not both and not neither of one.

This allows us to write n is even as the negation of n is odd.

→ fact: An even integer can be written as 2 times some integer.
→ If n is even, there exist an integer m such that $n = 2m$.

Substituting 2m for n in the antecedent, we get:

$$3n + 2 = 3(2m) + 2$$ ($\because$ as we assumed n is even)

$$= 6m + 2$$
$$= 2(3m + 1)$$

Since $3m+1$ is an ~~iteo~~ integer, and the antecedent is ~~twice~~ says that, the antecedent is even. but that contradicts our assumption that the antecedent of the conditional is odd.

So here we derived the given contradiction. So the assumption that n is even has to be rejected and we can conclude that n is odd.

4B continue

where hamilton 2CS305

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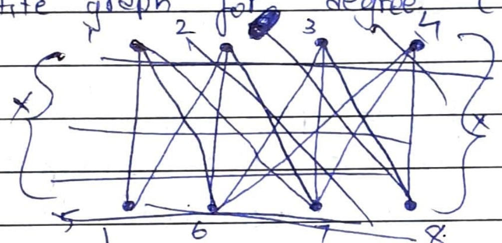
4 (A). Bipartite :

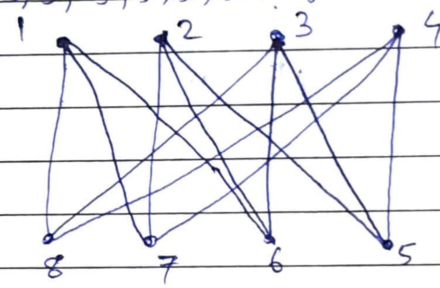
definition:

A simple graph G is bipartite if V can be partitioned into two disjoint subsets V_1 and V_2 such that every edge connects a given vertex in V_1 and a vertex in V_2.

In short, there are no edges which connects two verteces in V_1 or in V_2.

bipartite graph for degree (3,3,3,3,3,3,3,3) :





Isomorphism:

definition:

→ The simple graph $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ are isomorphic if there is a one-to-one and onto function f from V_1 to V_2 with the property that a and b are adjecent in G_1 ~~for all~~ if and only if f(a) an f(b) are adjecent in G_2, for all a and b in V_1. Such a function f is called an isomorphism where two simple graphs that are not isomorphic are called as nonisomorphic.

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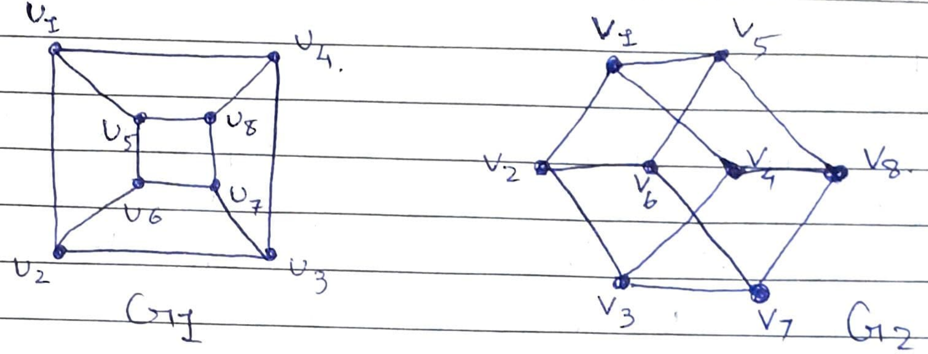
4A continue



here both graph has equal number of verteces and edges, as graph G_1 has 6 verteces and 12 edges similar to graph G_2.

All the verteces of Graph G_1 has degree 3 and which is same of the graph G_2 in which also each vertice has degree 3

here let us define an injection function f from verteces of G_1 to the vertices of G_2 that preseves the degree of vertices. we will determine from that whether it is an isomorphism.

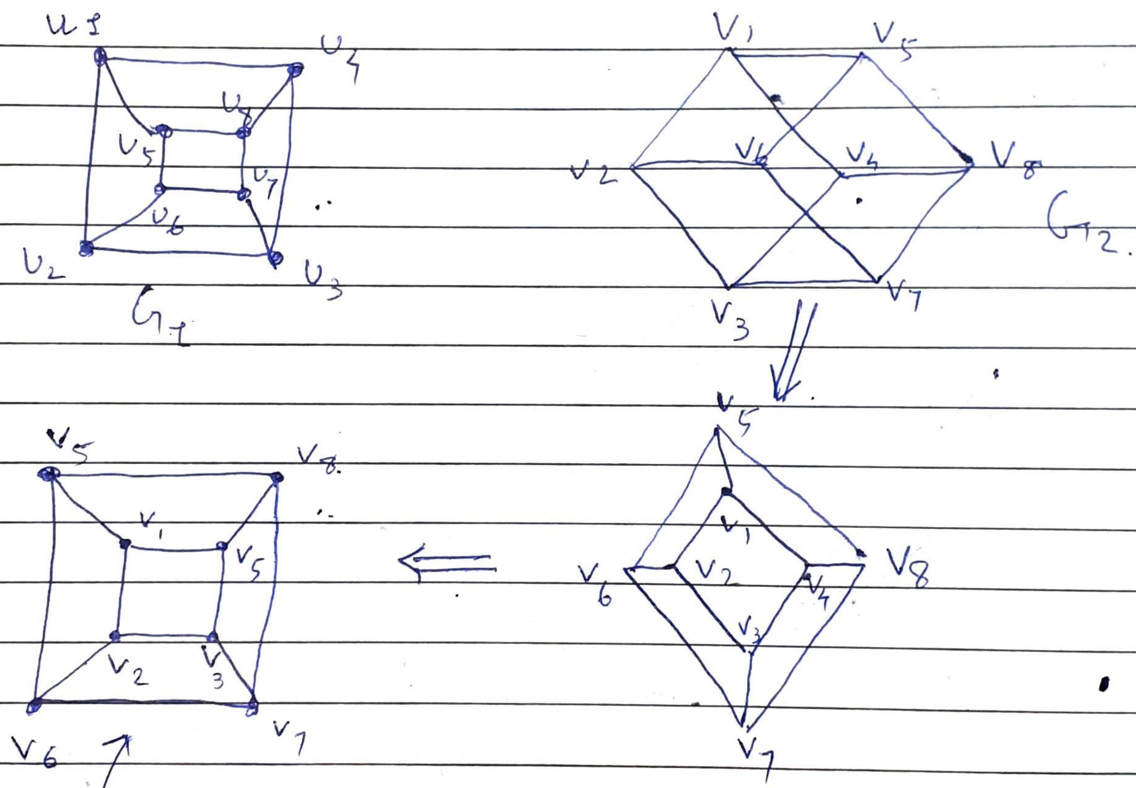
The function f with $f(u_1) = V_5$, $f(u_2) = V_6$; $f(u_3) = V_7$; $f(u_4) = V_8$

$f(u_5) = V_1$; $f(u_6) = V_2$, $f(u_7) = V_3$; $f(u_8) = V_4$.

This is one-to-one correspondence between G_1 and G_2. showing that this correspondence preserves edges is straight forward.

→ here f is an isomorphism, it follows that the graph G_1 and G_2 are isomorphic graph.

we can also show the graph G_2 as G_1 as per following figure:



which is similar to G_1.

4(B) Hamilton circuit:
definition: A simple circuit in a graph G that passes through every vertex exactly once is called Hamilton circuit.

for example, the simple circuit $x_0, x_1, x_2, \ldots, x_{n-1}, x_n, x_0$ (with $n>0$) is a hamilton circuit if $x_0, x_1, \ldots, x_{n-1}, x_n$

4B continue

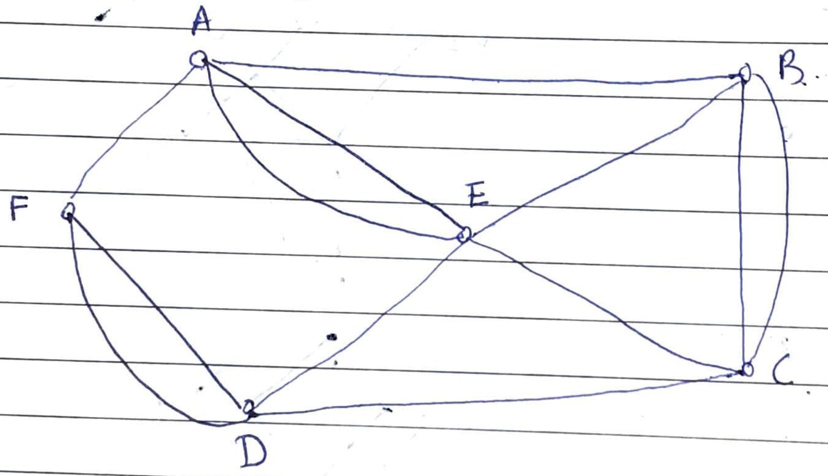
- is a hamilton path.

where hamilton path is:

A simple path in a graph G that passes through every vertex exactly once.

~~According to Dirac's theorm which states that If G is simple graph,~~

here graph given is



~~here~~ let ~~us~~ ~~start~~ from this graph has multiple edges and loops. so it ~~has~~ is ~~no~~ not simple graph. And thus it has no Hamilton circuit.

→ Eular's circuit

definition:

A Eular's circuit in a graph G is a simple circuit containing every edge of G.

Also A Eular's path is in G is a simple path containing every edge of G.

→ for any circuit to be a Euler circuit the degree of all the vertices should be even.

But as per the ~~p~~ graph vertices F A B E C D are of odd degree.

∴ This graph doesn't have Euler circuit.

* → for any circuit to be hamilton circuit degree of any vertex should be greater than or equal to $n/2$.

∴ All the vertices have degree ≥ 3.

∴ Hamilton circuit exists in the following graph.

→ Now hamilton path is that ~~p~~ path which passes throw the vertex exactly once.

starting from point A, the Hamilton Path of circuit would be

A B C E D F A.

This is one of the Hamilton circuit if started from point A.