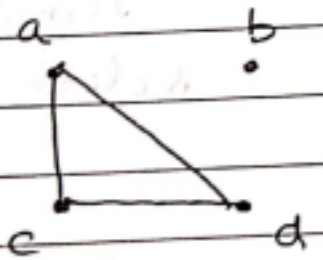
Complement Graph:-

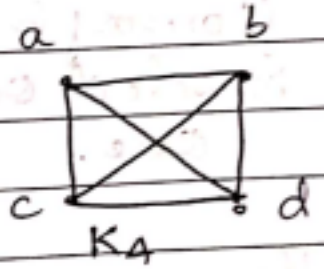
Complement of a Simple Graph 'G' is a Graph $\bar{G}$, on the same set of Vertices as G, such that there will be an edge between two vertices u & v in $\bar{G}$ iff there is no edge b/w u & v in G.

- (u, v) are adjacent in $\bar{G}$, iff they are not adjacent in G
- $V(G) = V(\bar{G})$
- $E(\bar{G}) = \{(u,v) \mid (u,v) \notin E(G)\}$
- $E(\bar{G}) = E(K_n) - E(G)$
- $G \cup \bar{G} = K_n$ (complete Graph)
- $G \cap \bar{G}$ = null Graph.

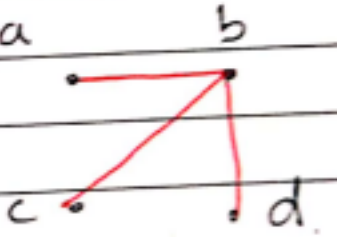
Eg:-



G_1

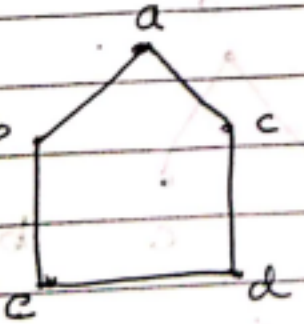


K_4 (Complete Graph)

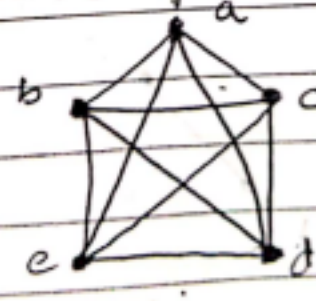


$\bar{G}_1$

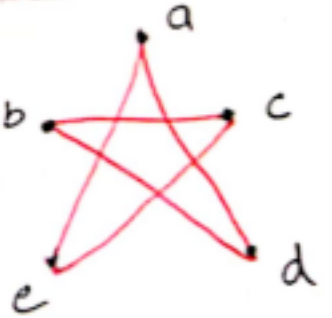
Eg 2:-



G_2



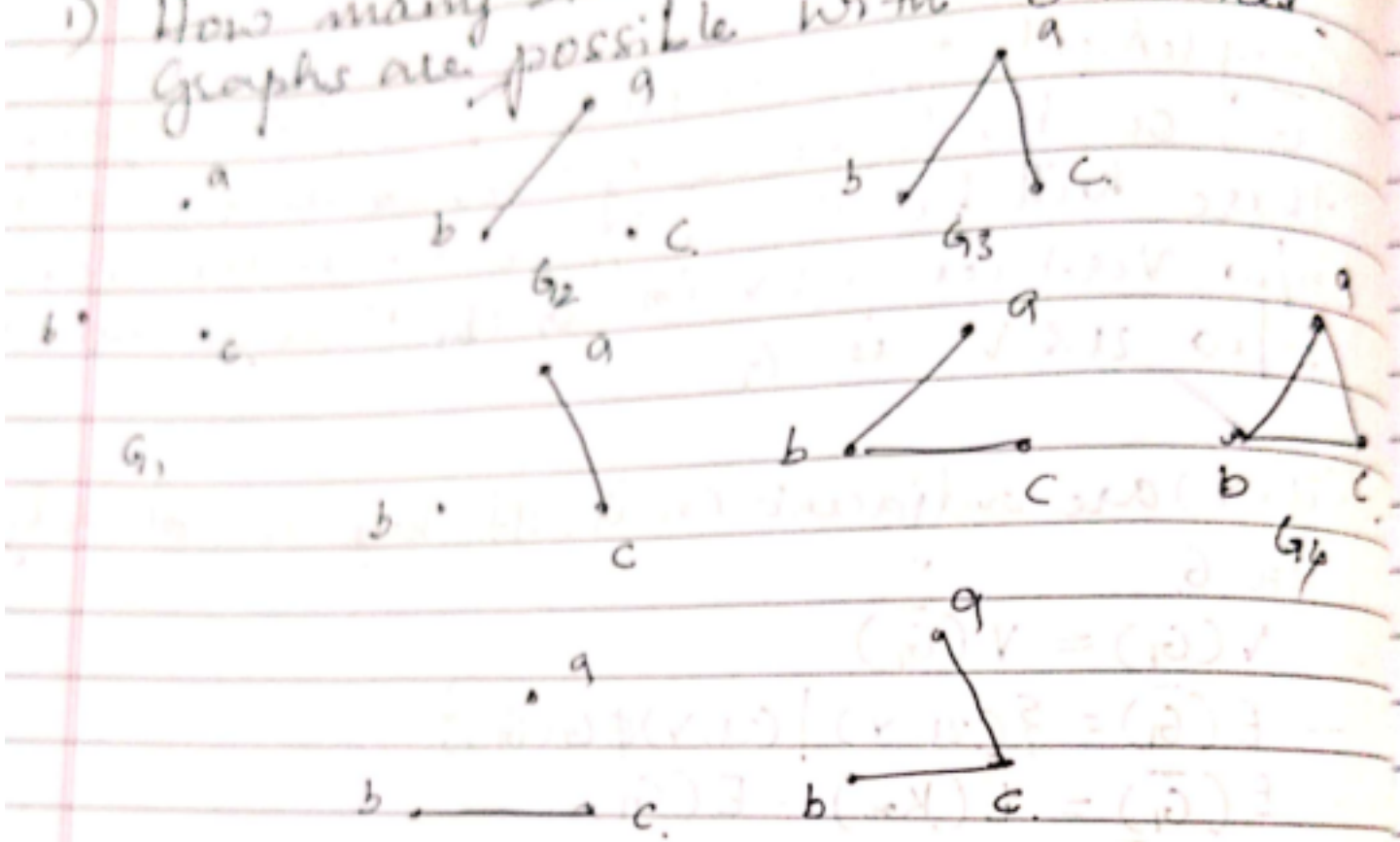
K_5



$\bar{G}_2$

Isomorphic Graphs.

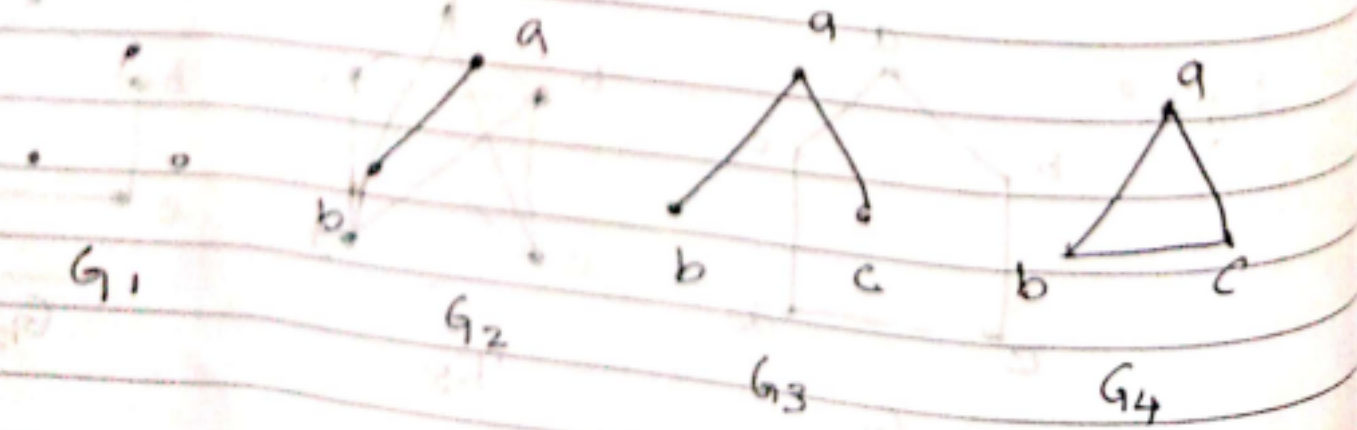
1) How many simple non-Isomorphic Graphs are possible with 3 Vertices.



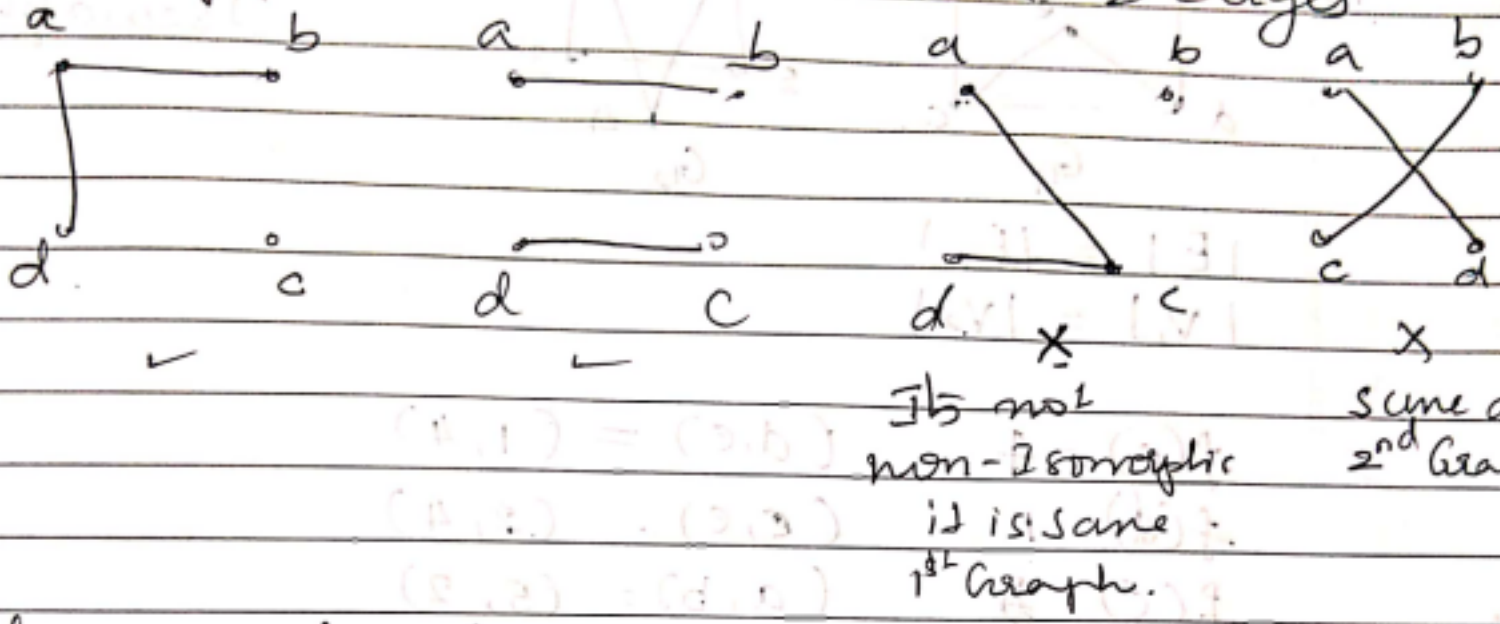
all the 3 are isomorphic so Select only one.

all 3 are Isomorphic Select One.

Therefore there are 4 non-Isomorphic Graphs with 3 Vertices



How Many Simple non-Isomorphic Graphic are possible with 4 Vertices & 2 edges



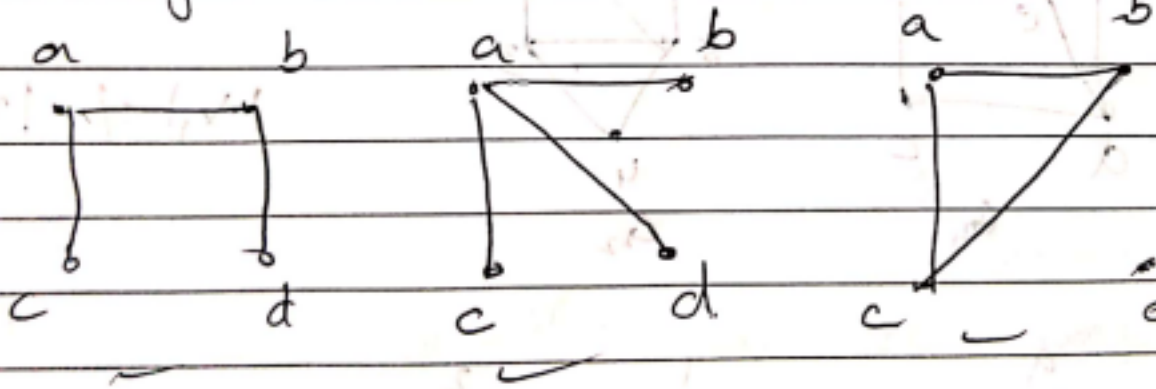
✓ ✓ ✗ ✗

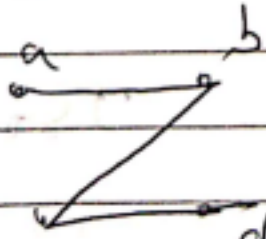
Is not non-Isomorphic it is same 1st Graph.

same as 2nd Graph

There only there are 2 Non-Isomorphic

4 Vertices 3 edges Non-Isomorphic Graph.





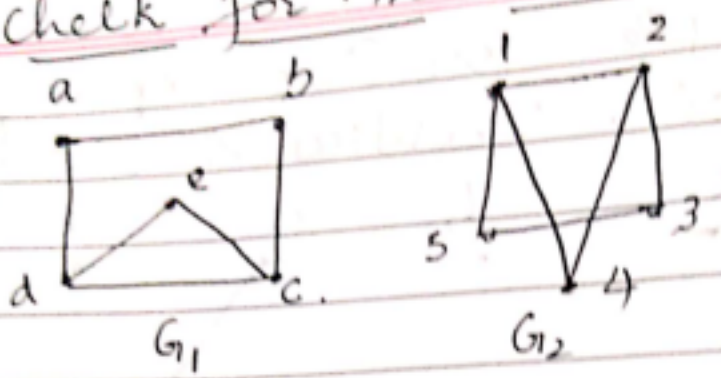
✗

Same as 1st Graph.

Therefore there are 3 Non-Isomorphics with 3 edge & 4 Vertice.

check for their Isomorphic properties

1)



Isomorphic

$|E_1| = |E_2|$

$|V_1| = |V_2|$

$f(e) = 4$ $\quad (d,e) = (1,4)$

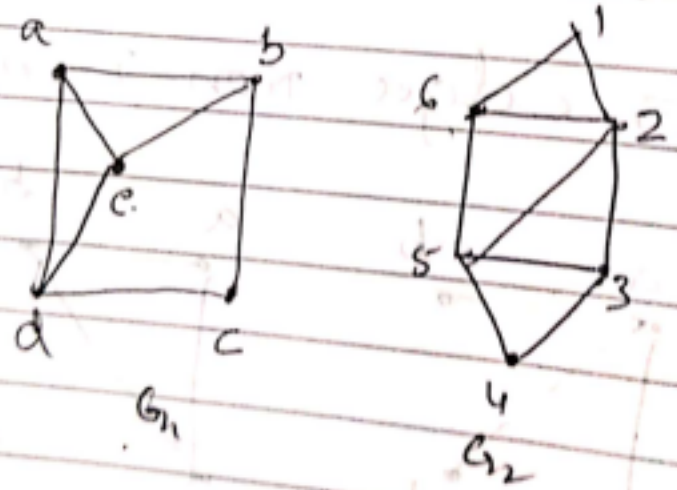
$f(d) = 1$ $\quad (e,e) = (2,4)$

$f(c) = 2$ $\quad (a,b) = (5,3)$

$f(a) = 5$ $\quad (a,d) = (5,1)$

$f(b) = 3.$ $\quad (b,c) = (3,2)$

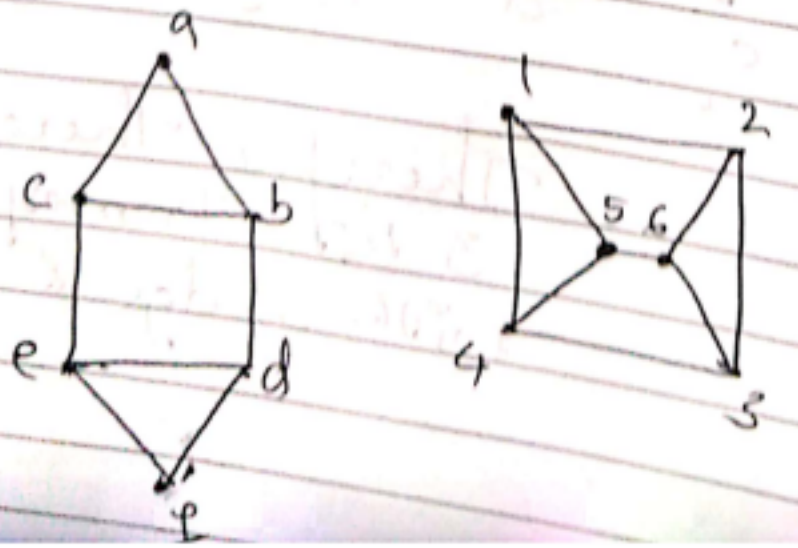
2)



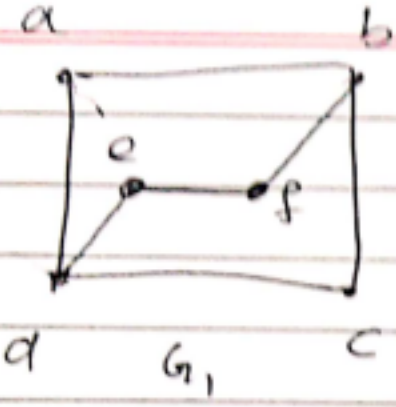
Not Isomorphic

$|V_1| \neq |V_2|$

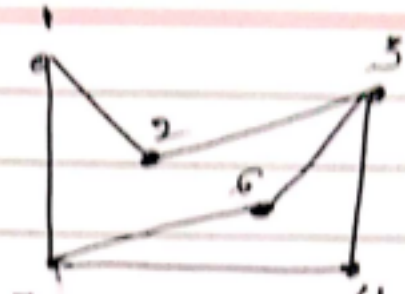
3



Isomorphic



G_1



G_2

$|V_1| = |V_2|$

$|E_1| = |E_2|$

Consider the vertex
the degree of it's n
2 & 3, in G_1, e
having the same pro

$f(d) = 5$

$f(c) = 4$

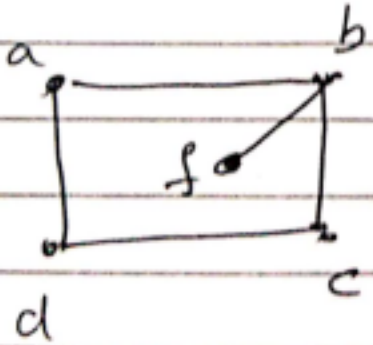
$f(b) = 3$

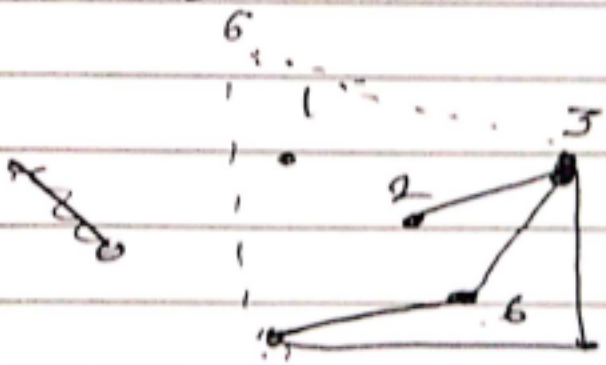
$f(a) = 6$

$f(e) = 1$

$f(f) = 2$.

removing e from G_1
from G_2





same as G

Therefore they are Isomorphic