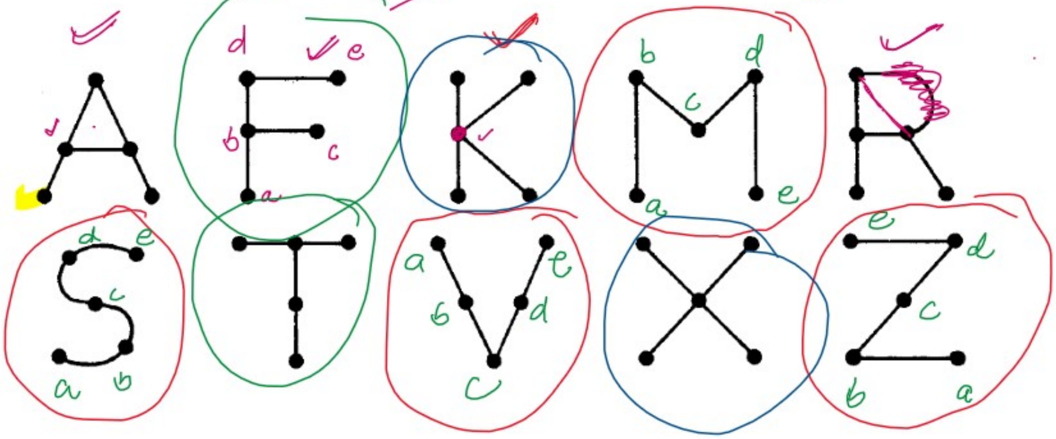
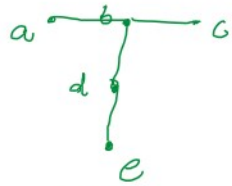
L21 28 Mar 2022

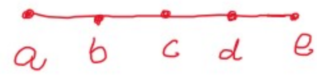
28 March 2022 10:04

Isomorphic Graphs :-





A and R are Isomorphic



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

$G_1 \to V_1, E_1$

$f: V_1 \to V_2$

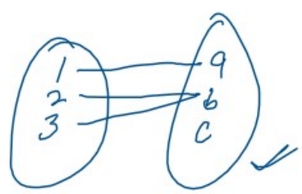
one-one and onto

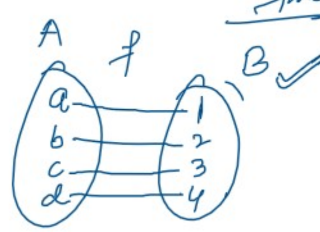
$G_2 \to V_2, E_2$

a, b are adjacent

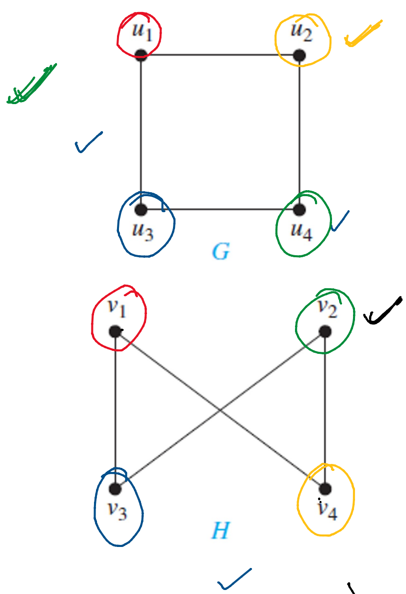
f(a), f(b) are also adjacent in G_2

one-one and onto function





one-one



G

$V_1 = \{u_1, u_2, u_3, u_4\}$

H

$V_2 = \{v_1, v_2, v_3, v_4\}$

$f: V_1 \to V_2$

$f(u_1) = v_1$

$f(u_2) = v_4$

$f(u_3) = v_3$

$f(u_4) = v_2$

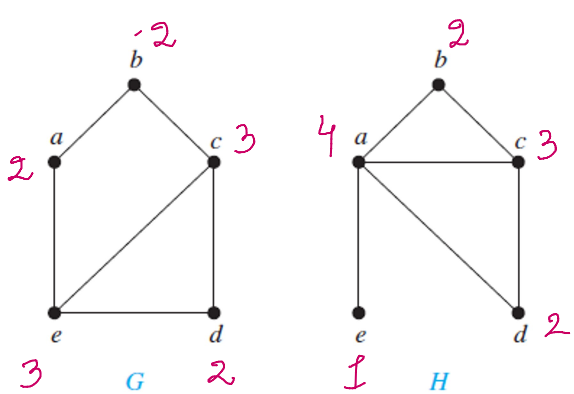
Adjacency Matrix for G

	u_1	u_2	u_3	u_4
u_1	0	1	1	0
u_2	1	0	0	1
u_3	1	0	0	1
u_4	0	1	1	0

	v_1	v_4	v_3	v_2
v_1	0	1	1	0
v_4	1	0	0	1
v_3	1	0	0	1
v_2	0	1	1	0

If two graphs G_1 and G_2 are isomorphic to each other then

1. the no. of vertices in G_1 and G_2 are same.
2. the no. of edges in G_1 and G_2 are same.
3. Degree sequence in both G_1 and G_2 are same



1. No. of vertices: G → 5, H → 5
2. No. of edges: G → 6, H → 6
3. Degree sequence in G

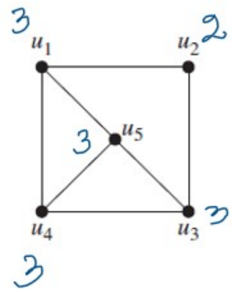
③ Degree sequence in G

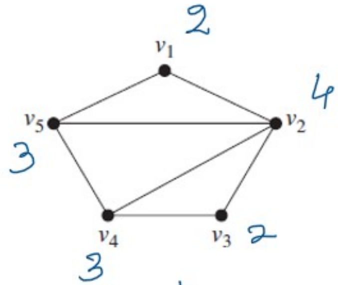
3,3,2,2,2

Degree sequence in H

4,3,2,2,1

NOT isomorphic





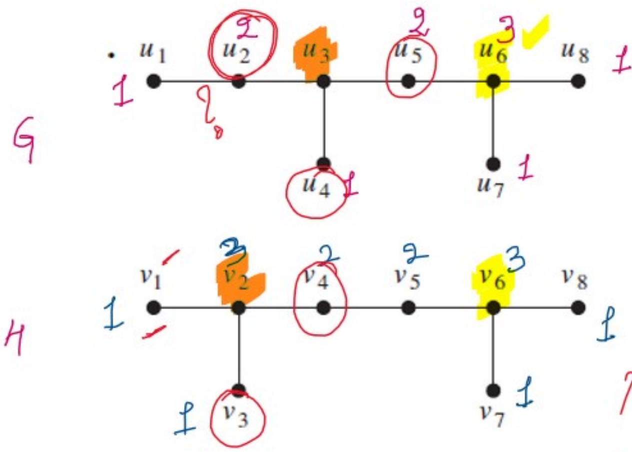
3,3,3,3,2

4,3,3,2,2

No. of vertices = 5

No. of edges = 7

NOT isomorphic



No. of vertices = 8

No. of edges = 7

Degree sequence in G 3,3,2,2,1,1,1,1

Degree sequence in H 3,3,2,2,1,1,1,1

NOT isomorphic