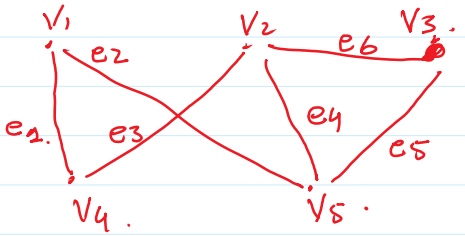
Lecture 25 :- Incidence Matrix.

Rows = Vertices.
Col = Edges.

Ex 6. 552.



$$\begin{array}{c} \\ V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \end{array} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$$
$e_1 \quad e_2 \quad e_3 \quad e_4 \quad e_5 \quad e_6$.

Observation :- 1) If two Columns are equal → multi edges exist

2). If is a Single one in a Col → loop.

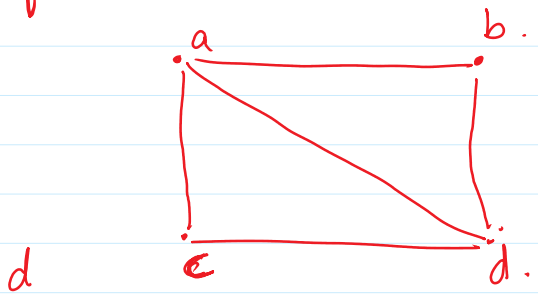
3). Rowwise Sum = Degree of Vertex. when ↑ loop.

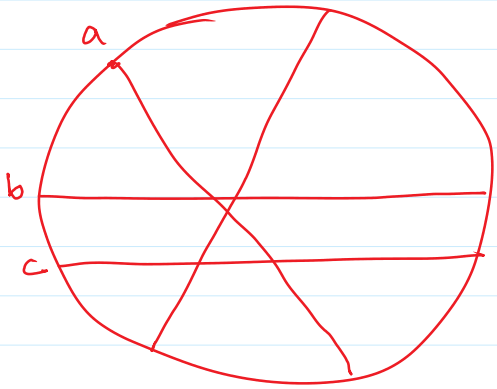
4) If column wise Sum for all. Columns = 2 → No loop.

Ex 7 :- HW.

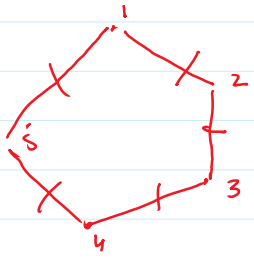
Circular Graph :-

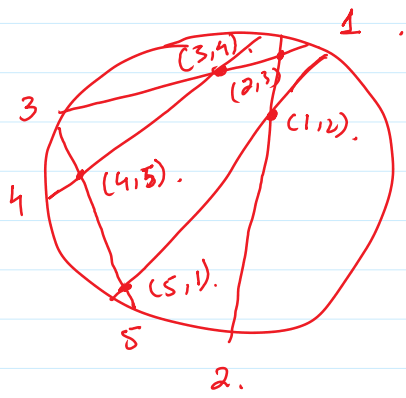
P556.



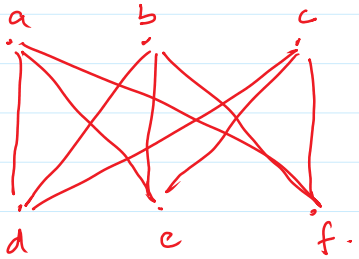


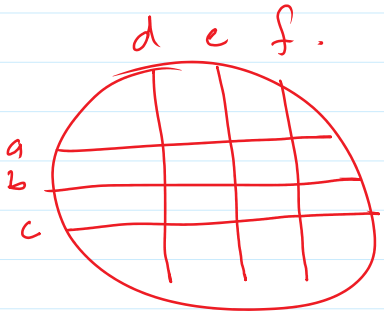
→ for each vertex ∃ a chord.
→.



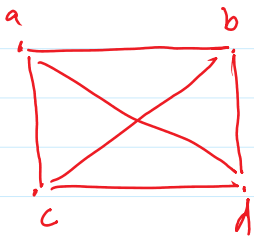


$K_{3,3}$.

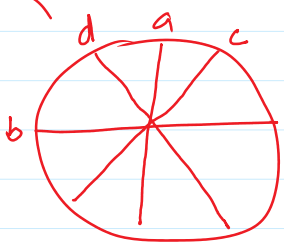




K_4.

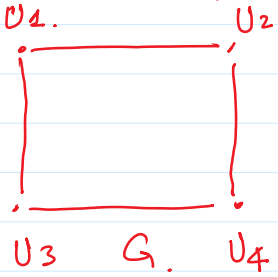


Possible.

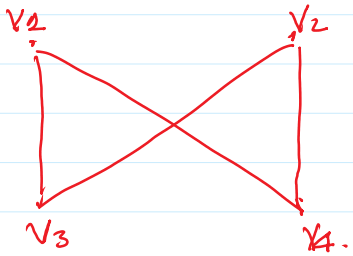


1- Graph → Incidence Matrix. → Circular.
adjacency ".
" ← " " ← ".

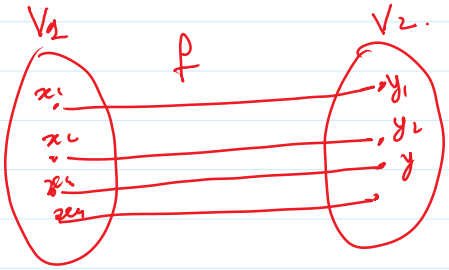
"Graph Isomorphism"



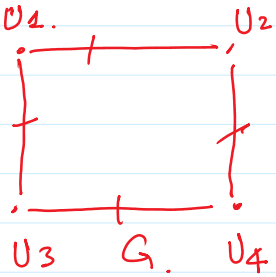
"Consider $G_1 = (V_1, E_1)$ are Simple
$G_2 = (V_2, E_2)$. Graphs.
They are Isomorphic.
when
$\exists$ a one-to-one $\wedge$
onto fn from.
V_1 to V_2. with a property
that if "a" & "b" are adjacent
in G1 Then
f(a) & f(b) are adjacent
in G2.



H.

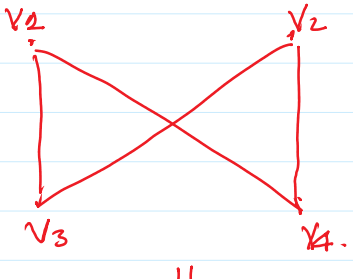


(onto & 1-to-1.)



$V_1 = \{u_1, u_2, u_3, u_4\}$.
$V_2 = \{v_1, v_2, v_3, v_4\}$.

$f(u_1) = v_1$. ✓ (u_1, u_2) $f(u_1)\, f(u_2)$ (v_1, v_4).
$f(u_2) = v_4$ ✓ (u_1, u_3) $f(u_1)\, f(u_3)$ (v_1, v_3).
$f(u_3) = v_3$ ✓ (u_2, u_4) $f(u_2), f(u_4)$ (v_4, v_2)
$f(u_4) = v_2$. (u_3, u_4) $f(u_3), f(u_4)$ (v_3, v_2).



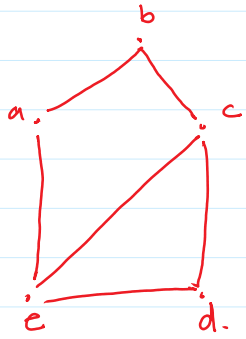
H.

H.

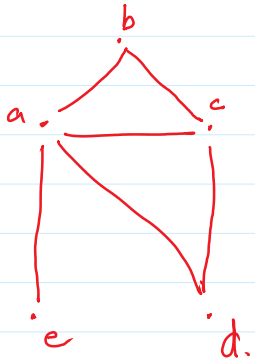
How to check for Isomorphism.

1- Same # of Vertices.
2- " " " Edges.
3- " Degrees.
4- Adjacent Degrees should match.

Ex 9: 554.

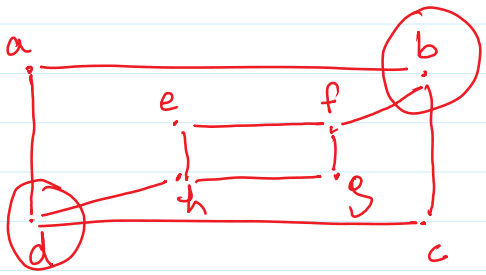


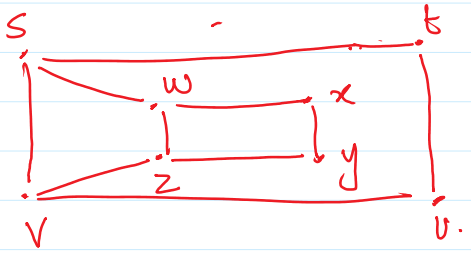
G



H.

	G	H
1) Vertices.	5,	5.
2) Edges.	6,	6.
3) degree 2	0,	1.





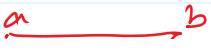
1) ✓
2) ✓
3) ✓

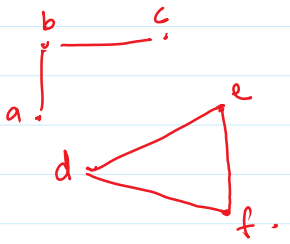
$f(a) = t$. t, x, u, y

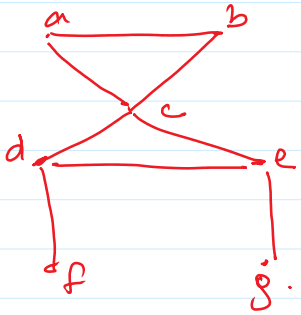
Connectivity :- path.

Connected Vertices :- Two Vertices are Connected if ∃ a path btw the two.

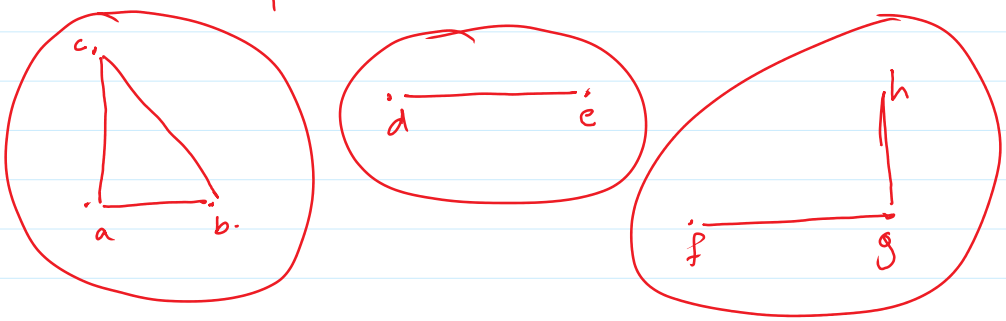
Connected Graph :- if ∃ a path btw every pair of distinct Vertices.





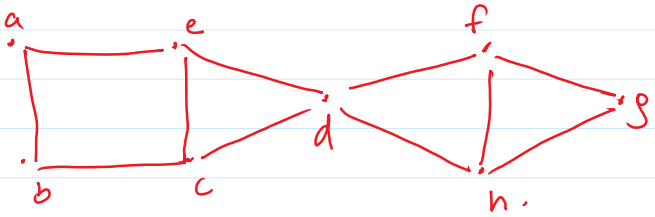


Connected Component.

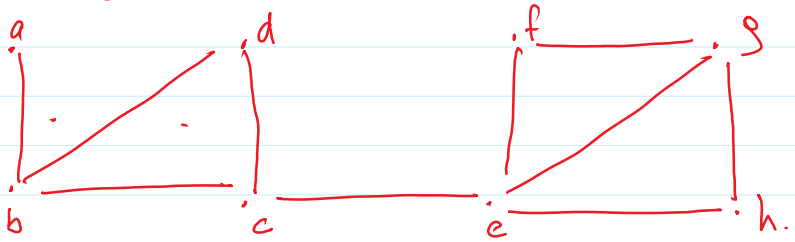


1- Subgraph of Original Graph.
2- Maximally Connected.

Cut Vertex:-



Cut Edge:-



How to check for Isomorphism.
1- Same # of Vertices.

How to check for Isomorphism.

1- Same # of Vertices.
2- " " " Edges.
3- " Degrees.
4- Adjacent Degrees should match.
5- Cut edges. should match.
6- Cut Vertices " " .