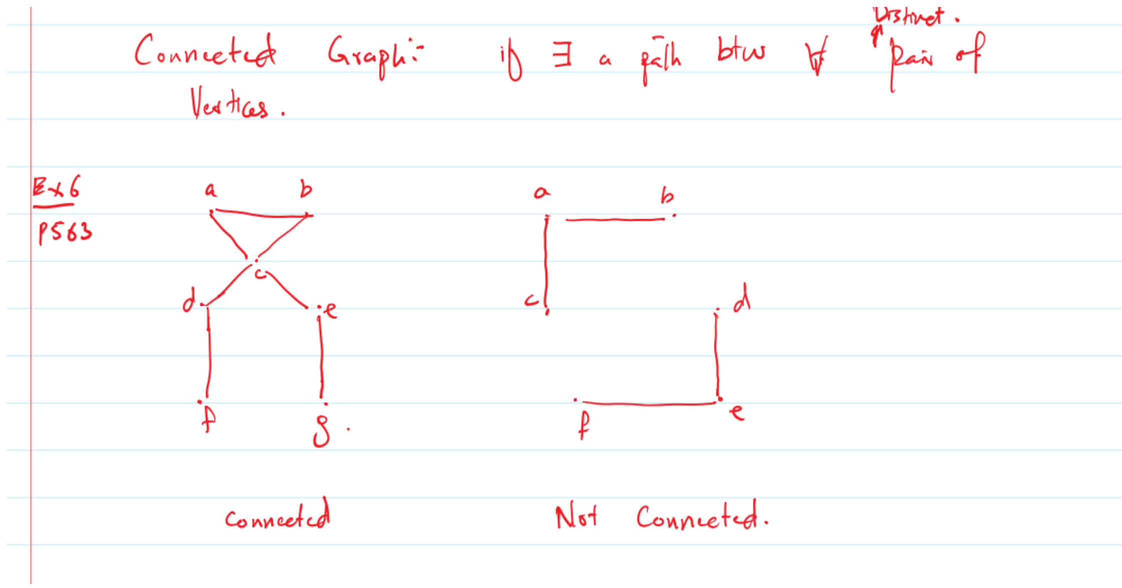
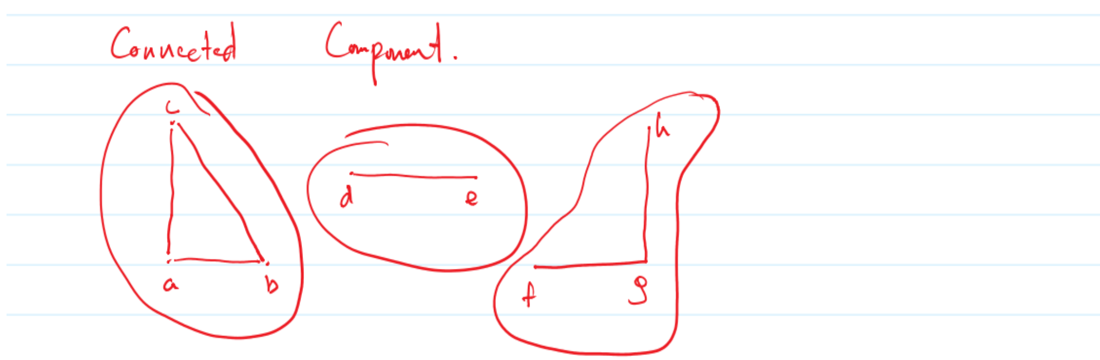
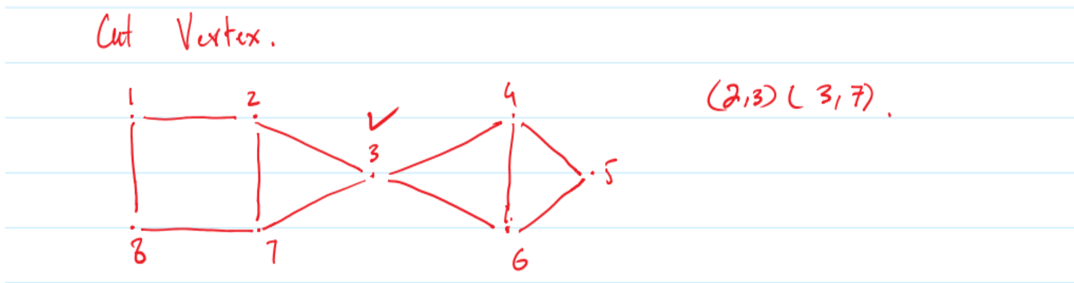
Discrete Lecture # 23

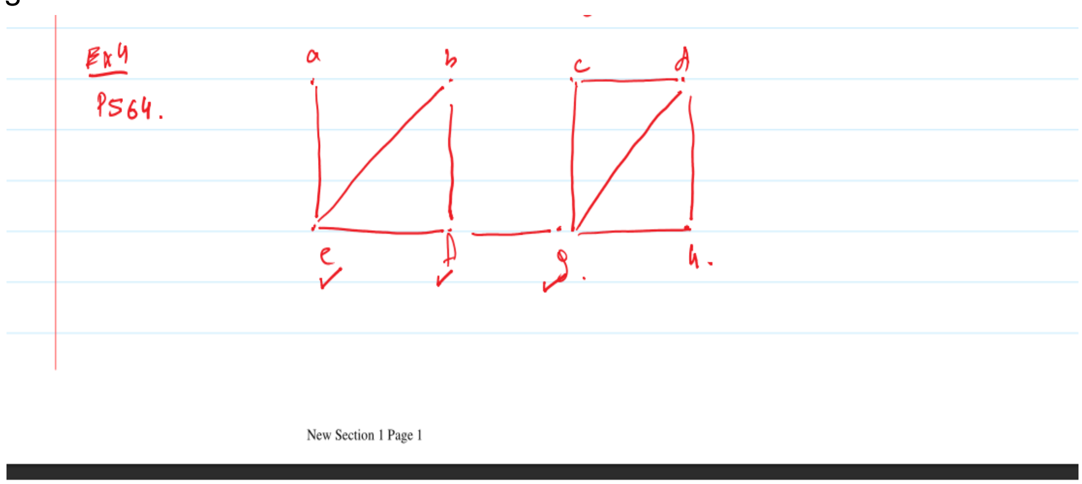
- Connectivity :
    - Connected Graph
        - If there exist a path from every vertex to every other vertex then the graph is connected
        - 

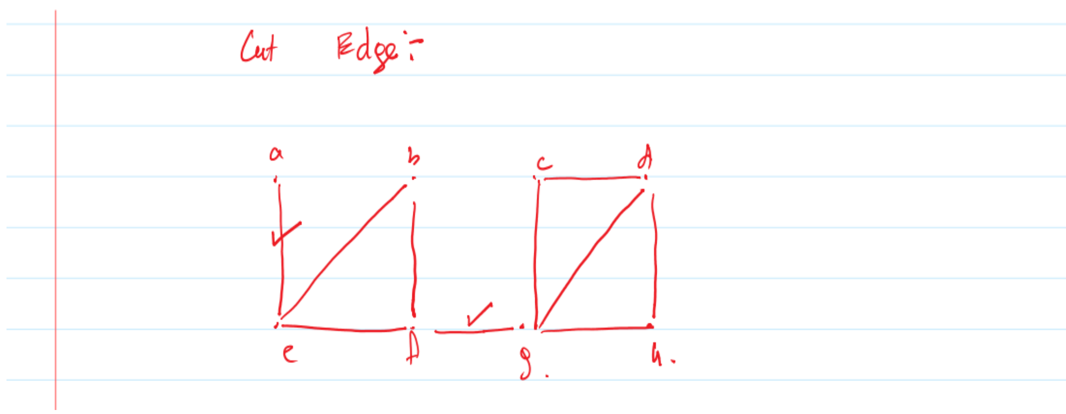
        - Difference of a connected and a graph that is not connected
    - Connected Component
        - If there exist a graph such that its component are connected
        - 

        - This is one graph with three connected components
    - Cut Vertex :
        - A vertex that if it is removed from the graph and all its edges as well then the graph is not connected is called a cut vertex

- 

- Cut Edge :



- 

- If we remove the edge f - g , this graph will become not connected
- There exist a cut edge in this graph that divides the graph into two components

- Directed Graph:
  - Strongly Connected :

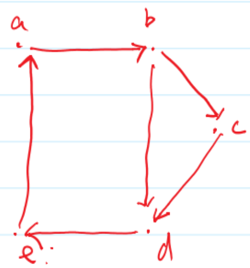
Directed Graphs.

1- Strongly Connected:

$\forall a,b \in V$ iff $\exists$ a path from a to b $\wedge$ b to a.

-
- A graph is strong connected if there exist a path from a to b AND b to a

Ex12:- PS65



a to b.	b to a.
a to c	c to a
a to d	d to a
a to e	e to a.
b to c	c to b.
b to d	d to b.
b to e	e to b
⋮	

Strongly Connected.

-
- Weakly Connected:

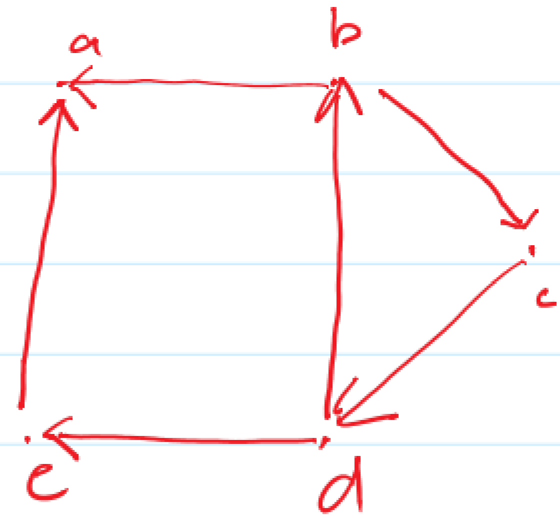
a b to a.

2- Weakly Connected:

$\forall a,b \in V$ iff $\exists$ a path from a to b $\vee$ b to a.

-

- A graph is weakly connected if there exist a path from a to b OR b to a

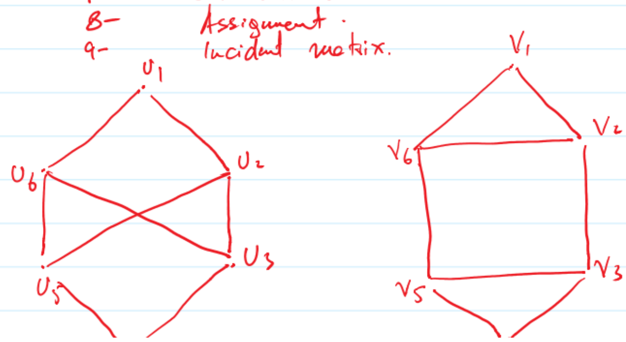


- Another way to check a weakly connected graph is to draw a undirected graph of the directed graph and if it is connected then it is a weakly connected graph

- Isomorphism

Isomorphism :
1- Vertices.
2- Edges.
3- Degrees.
4- Adjacent.
5- Circuits.
6- Cut Edges.
7- Cut Vertices.
8- Assignment.
9- Incident matrix.

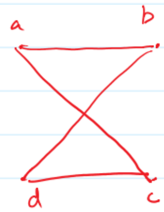
Ex 15
S66.



V: V4 V4

Ex16.

P567:-



$$A = \begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{c} \begin{array}{cccc} a & b & c & d \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix} \end{array}$$

ababa

acaca

abdba.

abdca

abaca

acdca

acdba

acaba.

$$A^4 = \begin{array}{c} \\ a \\ b \\ c \\ d \end{array} \begin{array}{c} \begin{array}{cccc} a & b & c & d \end{array} \\ \begin{bmatrix} 8 & 0 & 0 & 8 \\ 0 & 8 & 8 & 0 \\ 0 & 8 & 8 & 0 \\ 8 & 0 & 0 & 8 \end{bmatrix} \end{array}$$