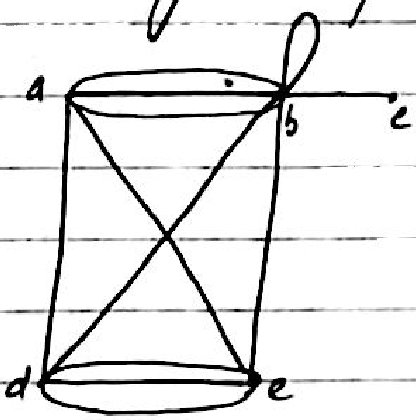
Subject: ____________ Date: ____________

(Lecture 23,24) —: Graphs :—

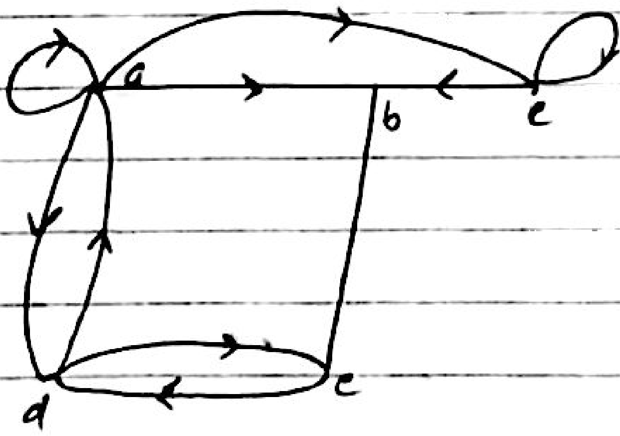
Degree of Vertex:-

Total number of edges at one point is called Degree of Vertex.



degree of vertex for this graph:-

deg (a) = 5
(b) = 8
(c) = 1
(d) = 5
(e) = 5



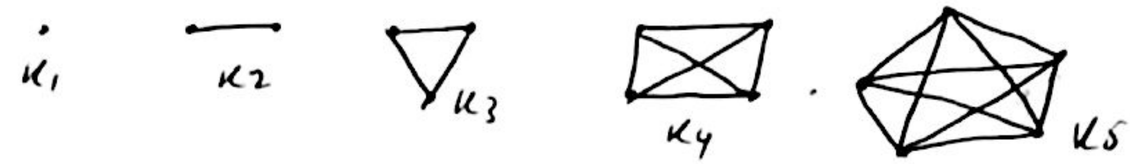
In degree means edges towards that vertex,
Out degree means edges outside or away to that vertex

in deg(a) = 2	Out deg(a) = 4
(b) = 2	(b) = 1
(c) = 2	(c) = 2
(d) = 2	(d) = 2
(e) = 2	(e) = 1

— Different Types of Graphs:—

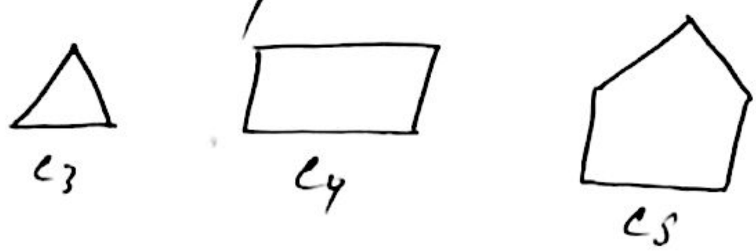
Complete Graph:-

It is represented by K. All vertices are joined to one another.



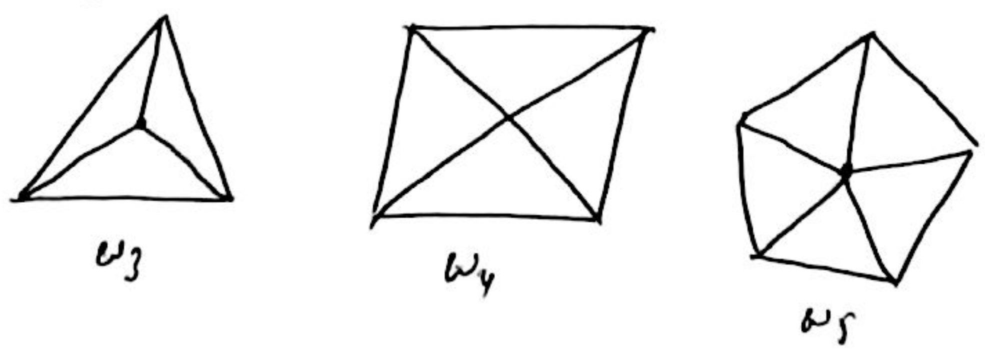
Cyclic Graph:-

It ends from where started, represented by C



Wheel Graph:-

Represented by W, One vertex should joined with all other vertex.



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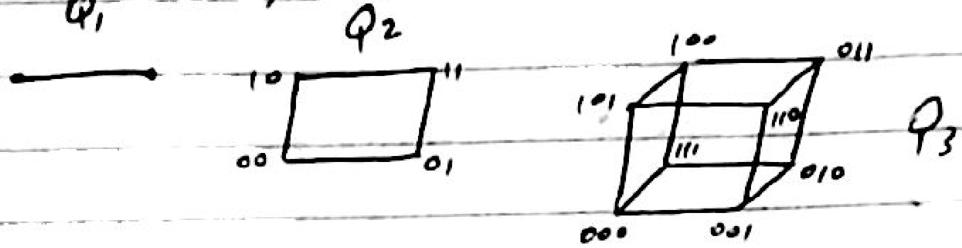
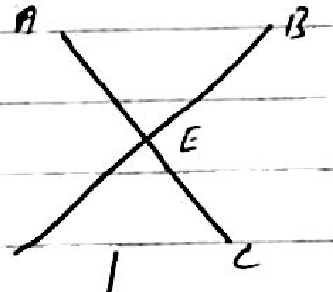
Cubic Graphs:-

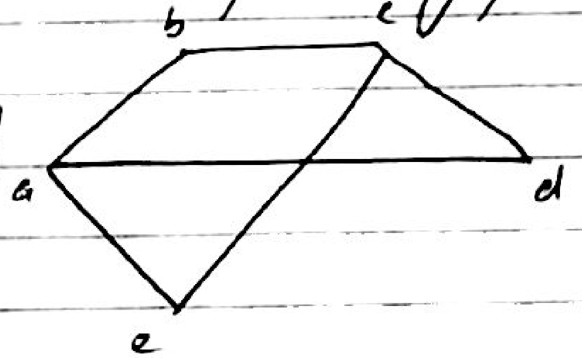
It is counted in bits and every bit has two points (0,1). Represented by Q



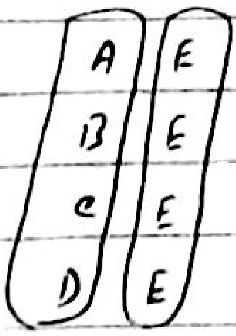
Bipartite Graphs:-

If we get atleast one point is common in graph, Then it is bipartite graph



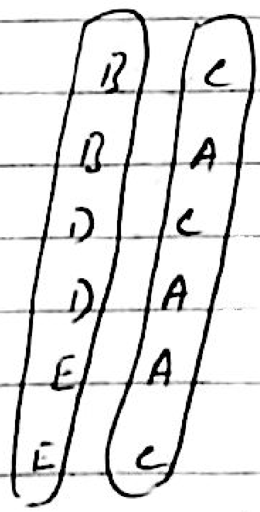


Write down its vertices



$\{A, B, C, D\}$, $\{E\}$

Graph is Bipartite.



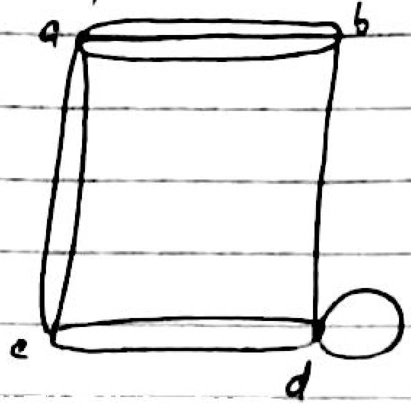
$\{B, D, E\}$, $\{A, C\}$

Graph is Bipartite

Subject ________ Date ________

From Graphs To Matrices

Adjacency Matrix



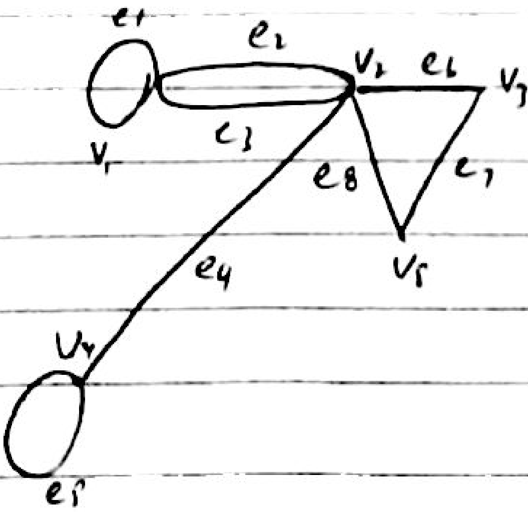
Write down the number of these lines between two points.

$$\begin{array}{c|c}
 & \begin{array}{cccc} a & b & c & d \end{array} \\
\begin{array}{c} a \\ b \\ c \\ d \end{array} & \begin{bmatrix} 0 & 3 & 2 & 0 \\ 3 & 0 & 0 & 1 \\ 2 & 0 & 0 & 2 \\ 0 & 1 & 2 & 1 \end{bmatrix}
\end{array}$$

These type of Matrix is called Adjacency Graph.

Incidence Matrix

In this Matrix, write 1 if two points are joined and write zero if they are not joined.

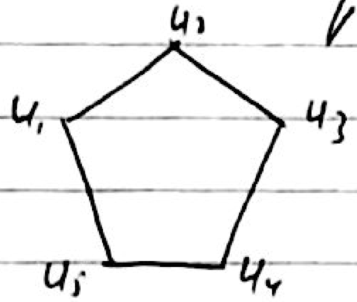


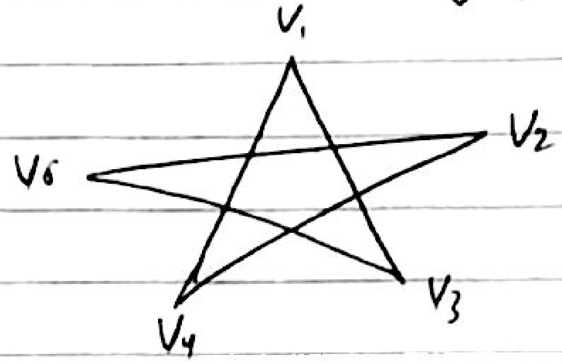
$$\begin{array}{c|c}
 & \begin{array}{cccccccc} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 & e_7 & e_8 \end{array} \\
\begin{array}{c} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \end{array} & \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \end{bmatrix}
\end{array}$$

Subject: ____________ Date: ____________

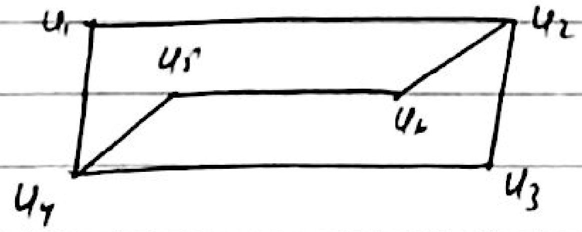
Isomorphic Matric or Isomorphic Graph.

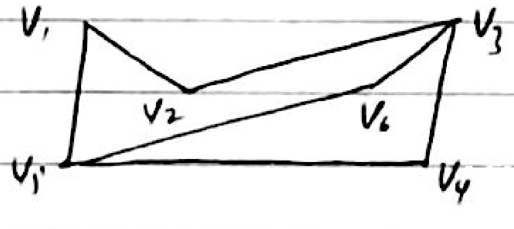
Two different matrices of two different graphs should be equal.





$$\begin{array}{c|ccccc} & u_1 & u_2 & u_3 & u_4 & u_5 \\ \hline u_1 & 0 & 1 & 0 & 0 & 1 \\ u_2 & 1 & 0 & 1 & 0 & 0 \\ u_3 & 0 & 1 & 0 & 1 & 0 \\ u_4 & 0 & 0 & 1 & 0 & 1 \\ u_5 & 1 & 0 & 0 & 1 & 0 \end{array} \qquad \begin{array}{c|ccccc} & V_1 & V_3 & V_5 & V_2 & V_4 \\ \hline V_1 & 0 & 1 & 0 & 0 & 1 \\ V_3 & 1 & 0 & 1 & 0 & 0 \\ V_5 & 0 & 1 & 0 & 1 & 0 \\ V_2 & 0 & 0 & 1 & 0 & 1 \\ V_4 & 1 & 0 & 0 & 1 & 0 \end{array}$$





$$\begin{array}{c|cccccc} & u_1 & u_2 & u_3 & u_4 & u_5 & u_6 \\ \hline u_1 & 0 & 1 & 0 & 1 & 0 & 0 \\ u_2 & 1 & 0 & 1 & 0 & 0 & 1 \\ u_3 & 0 & 1 & 0 & 1 & 0 & 0 \\ u_4 & 1 & 0 & 1 & 0 & 1 & 0 \\ u_5 & 0 & 0 & 0 & 1 & 0 & 1 \\ u_6 & 0 & 1 & 0 & 0 & 1 & 0 \end{array} \qquad \begin{array}{c|cccccc} & V_6 & V_3 & V_4 & V_5 & V_1 & V_2 \\ \hline V_6 & 0 & 1 & 0 & 1 & 0 & 0 \\ V_3 & 1 & 0 & 1 & 0 & 0 & 1 \\ V_4 & 0 & 1 & 0 & 1 & 0 & 0 \\ V_5 & 1 & 0 & 1 & 0 & 1 & 0 \\ V_1 & 0 & 0 & 0 & 1 & 0 & 1 \\ V_2 & 0 & 1 & 0 & 0 & 1 & 0 \end{array}$$

From Matrix To Graph

To draw graph from matrix, draw no of edges between two points as given in matrix

Example Matrix

Draw Graph from given matrix.

$$
\begin{array}{c} \\ a \\ b \\ c \\ d \end{array}
\begin{array}{c}
\begin{array}{cccc} a & b & c & d \end{array} \\
\begin{bmatrix} 0 & 3 & 2 & 0 \\ 3 & 0 & 0 & 1 \\ 2 & 0 & 0 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}
\end{array}
$$