Lecture 23:- Sessional.

Lecture 24:- Revision. Complete bipartite.

$K_{2,6}$.

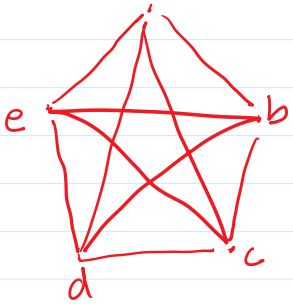
Sub Graph:- $G = (V, E)$. $H = (W, F)$.

$W \subseteq V$ & $F \subseteq E$.

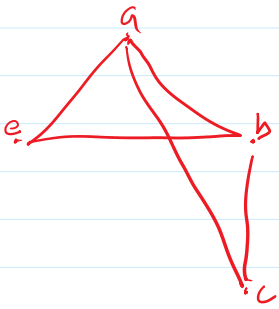
H is a subgraph of G.

$V = \{a, b, c, d, e, f\}$.

E = ? HW.



G



H.

$F \subseteq E$. ✓

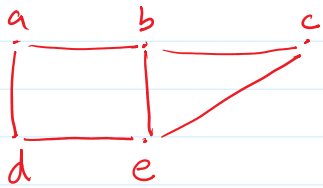
$F = \{(a,b), (a,c), (a,e), (b,c), (b,e), (b,a), (c,a), (e,a), (c,b), (e,b)\}$.

$W = \{a, b, c, e\}$.

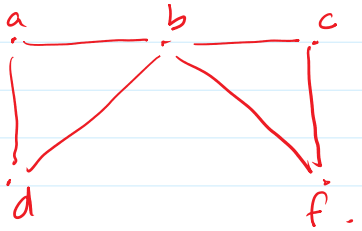
$W \subseteq V$. ✓

$H \subseteq G$. HW.

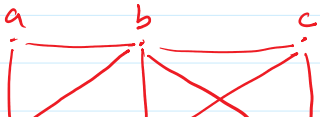
UNION & INTERSECTION.



G_1

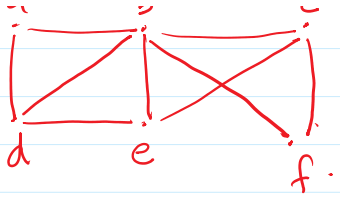


G_2.



HW.

Ex 546 – 549.

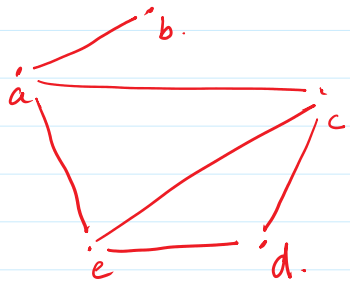


$G_1 \cup G_2$.

HW.
Ex 546 – 549.

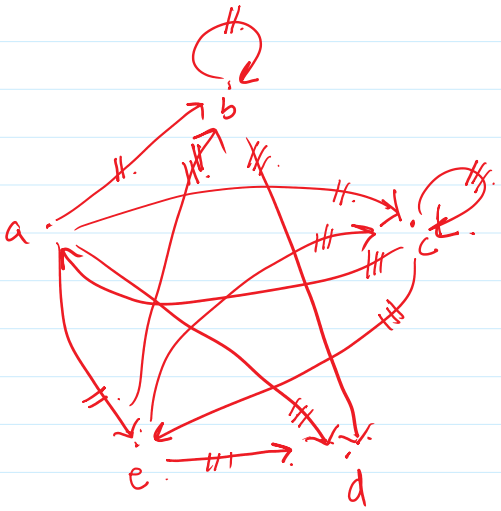
Graphs Representation.

1- Adjacency list.



Graph.

Vertices.	Adjacent Vertices.
a	b, c, e
b	a
c	a, e, d
d	c, e
e	a, c, d.

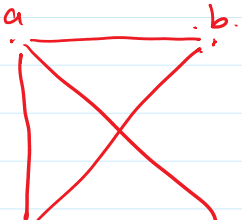


Directed Graph.

Vertices.	Terminal Vertex.
a	b, c, e, d
b	b, d
c	c, a, e
d	—
e.	b, c, d.

(ASCII) HW.

2- Incidant Matrix.



deg(a) = 3
(b) = 2
(c) = 2

Rows = Columns = |Vertices|.

	1 a	2 b	3 c	4 d	
1 a	0	1	1	1	3.
2 b	1	0	1	0	2.
3 c	1	1	0	0	2.
4 d.	1	0	0	0	1

(b) 22
(c) 22
(a) 21.

8.

	a	b	c	d	
c	1	0	0		2.
d.	0	0	0		1
	3	2.	2	1.	

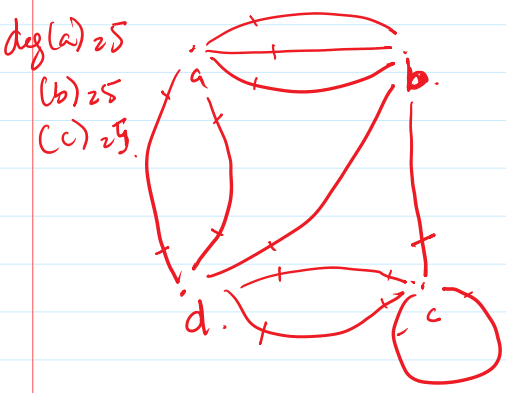
1- if ∃ a non-zero entry in Main diagonal. Then it is not a Simple Graph.

2- if ∃ an entry >1 → Not a Simple Graph.

3- The Rowwise / Columnwise Sum gives you the degree of Vertices.

Graph ⇄ Matrix.

Ex5
P552.



	a	b	c	d.	
a	0	3	0	2	5
b	3	0	1	1.	5
c	0	1	2	2	5
d.	2.	1	2	0	5.
					20.

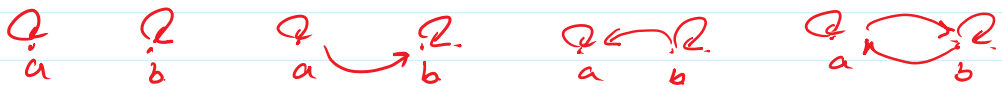
Sessional II.

1) $R_2 \{(a,b) \mid a-b \in z^+\}$. $\mathbb{R} \times \mathbb{R}$.

$\left[\frac{1}{2}\right]_2 \{\frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}, -\frac{5}{2} \text{ ---------- }\}$.

2) $\begin{bmatrix}1&0\\0&1\end{bmatrix}$ $\begin{bmatrix}1&1\\0&1\end{bmatrix}$ $\begin{bmatrix}1&0\\1&1\end{bmatrix}$ $\begin{bmatrix}1&1\\1&1\end{bmatrix}$.

$\begin{bmatrix}0&0\\0&0\end{bmatrix}$ $\begin{bmatrix}1&0\\0&0\end{bmatrix}$ $\begin{bmatrix}1&1\\1&0\end{bmatrix}$ $\begin{bmatrix}0&0\\0&1\end{bmatrix}$ $\begin{bmatrix}1&0\\0&1\end{bmatrix}$ $\begin{bmatrix}0&1\\1&0\end{bmatrix}$ $\begin{bmatrix}1&1\\1&1\end{bmatrix}$ $\begin{bmatrix}0&1\\1&1\end{bmatrix}$.

3). 

Graphs.

4). $\{\{a,d,e\}, \{b,c,f\}\}$.

$\{a,a,c\} = \{(a,a), (a,d), (a,e), (d,a), (d,d), (d,e), (e,a), (e,d), (e,e)\}$.

$\{__\} =$.

5) $R = \{(a,b) \mid a \cap b = b \cap a\}$.

16 elements.

$A = \{\{a\}, \{b\}, \{a,b\}, \{b,c\}\}$.

$A \times A = \{(\{a\},\{a\}),$

$=$ 14 elmnts.

$=$

$(\{b,c\},\{b,c\})\}$.

6). $A = \{a,b,c\}$.

$Pow(A) = \{\Phi, \{a\}, \text{---}\}$.

$Pow(A) \times Pow(A) =$ 64.

$= \{(\Phi,\Phi), (\Phi,\{a\}),$

$R = \{(a,b) \mid a \cap b = \Phi\}$.

27 elmnts.

7). $(P(\{a,b,c\}), \subseteq)$.

$\{a\} / \{b\}$. $\{a,b\} / \{c\}$. $\{a,b\} / \{b,c\}$.

$\{b\} / \{c\}$. $\{a,c\} / \{b\}$. $\{a,c\} / \{b,c\}$.

$\{c\} / \{a\}$. $\{b,c\} / \{a\}$.

Q3. $\overline{Q1,2,4,5}$.

CLO :- Q3. Q1, 2, 4, 5.

3, 4.

6. 15.