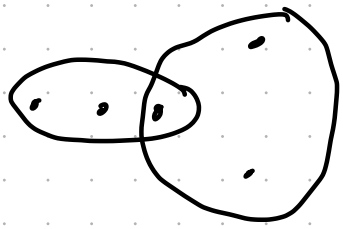
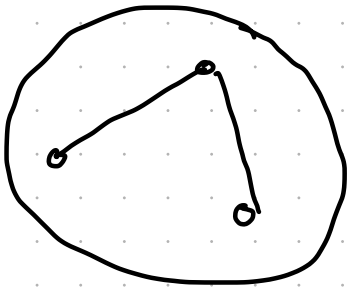
Hypergraph:

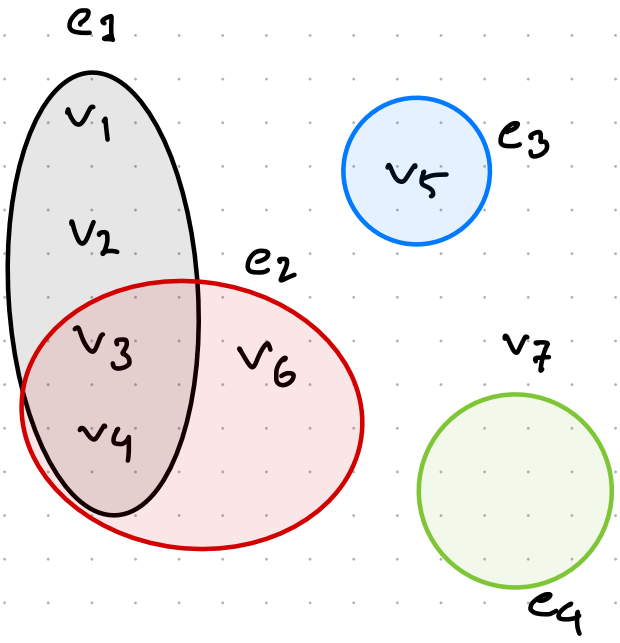
uniform hypergraph:



all the hyperedges are of same size.

2 uniform hypergraph is a graph.

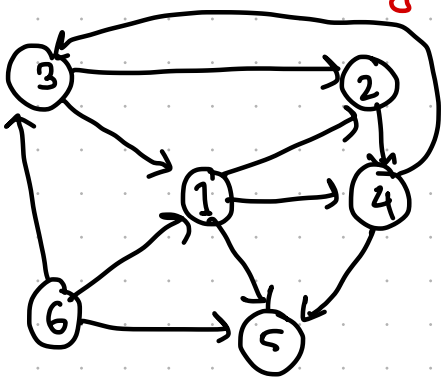




vertex/edge	Degree
v_1	1
v_2	1
v_3	2
v_4	2
v_5	1
v_6	1
v_7	0
e_1	4
e_2	3
e_3	1
e_4	0

Digraph (Directional Graph) to Graph

Co citation Coupling:



$A_{ij} = 1$ iff there is an edge $i \to j$

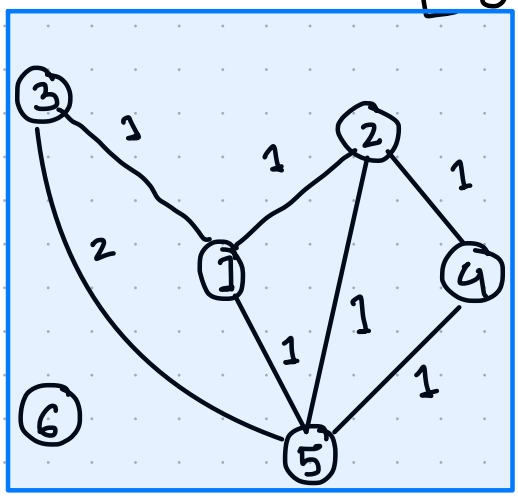
$A_{ij} = 0$ iff there is NO edge from i to j

$C = A^T A$

$$A = \begin{bmatrix} 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

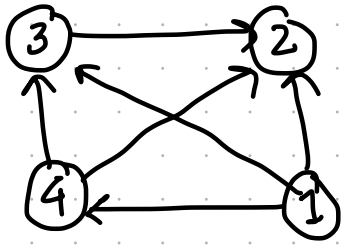
$$A^T = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$C = A^T A = \begin{bmatrix} 2 & 1 & 1 & 0 & 1 & 0 \\ 1 & 2 & 0 & 1 & 1 & 0 \\ 1 & 0 & 2 & 0 & 2 & 0 \\ 0 & 1 & 0 & 2 & 1 & 0 \\ 1 & 1 & 2 & 1 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$



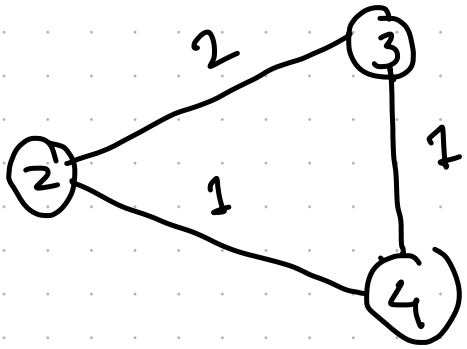
$C_{53} = C_{35} = 2$; meaning that two papers (4 & 6) are citing both papers 3 and 5.

Diagonal: যেই কতগুলো In-degree আছে।



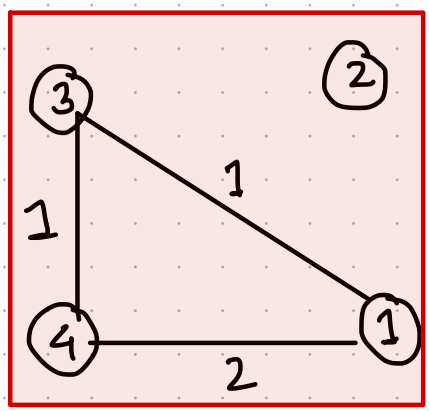
$$A = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{bmatrix} 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \end{array} \qquad A^T = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$A^T A = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 3 & 2 & 1 \\ 0 & 2 & 2 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix} \end{array}$$



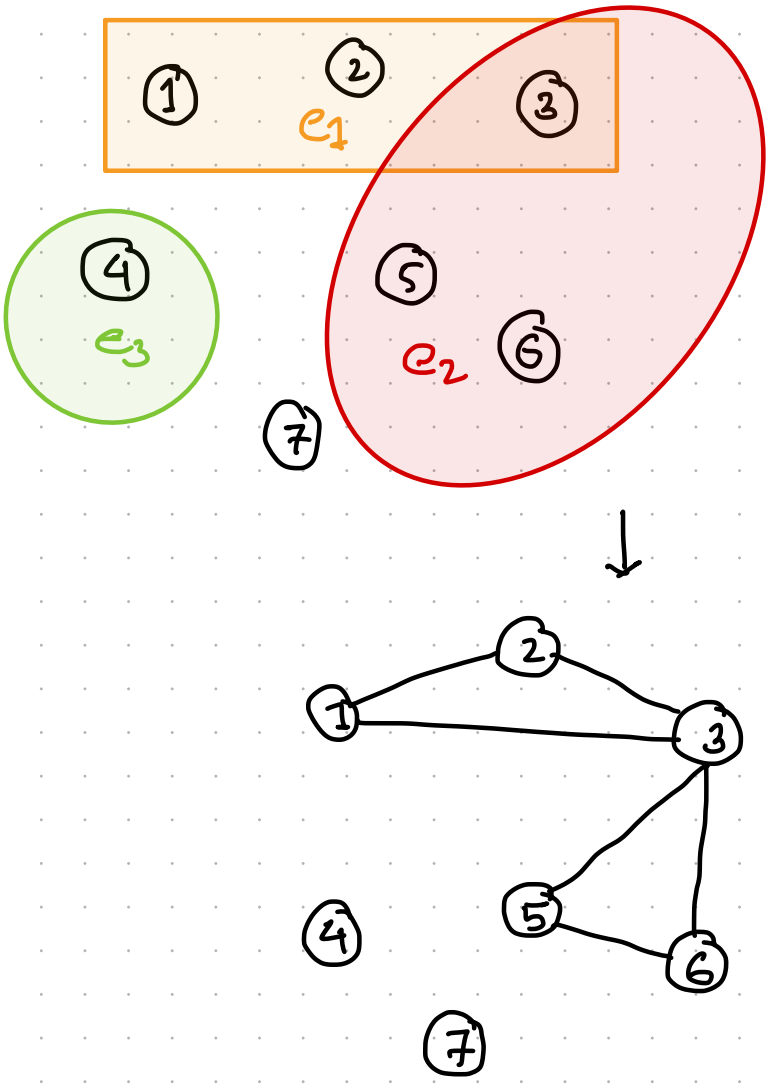
Bibliographic coupling:

$$AA^T = \begin{bmatrix} 3 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 2 & 0 & 1 & 2 \end{bmatrix}$$



Hyper Graph to Graph

Clique expansion:



Star expansion: