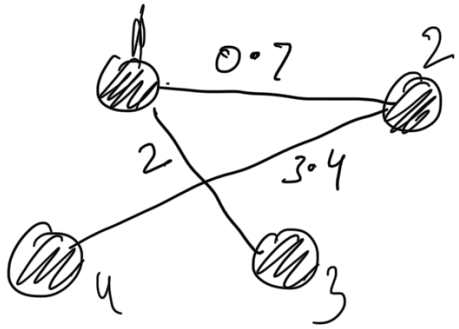
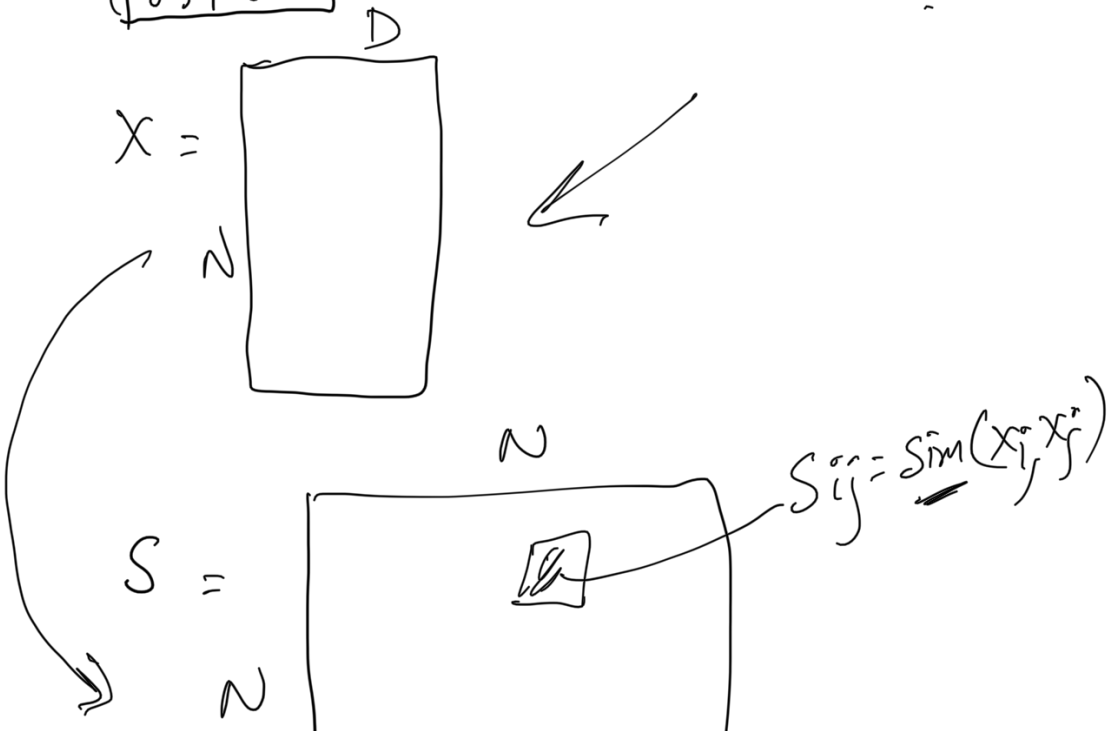
Clustering

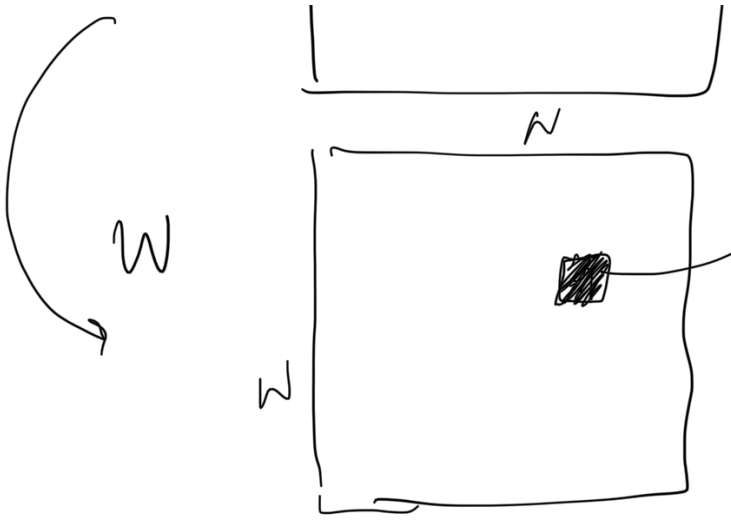
Fri Apr 30 -

weighted undirected Graphs.



	1	2	3	4
1	0	0.7	2	0
2	0.7	0	0	3.4
3	2	0	0	0
4	0	3.4	0	0



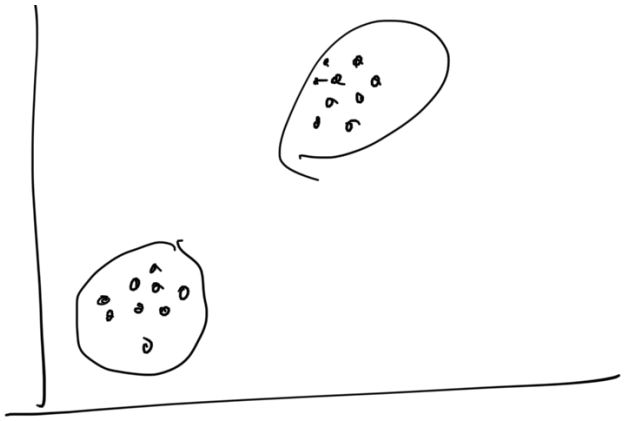


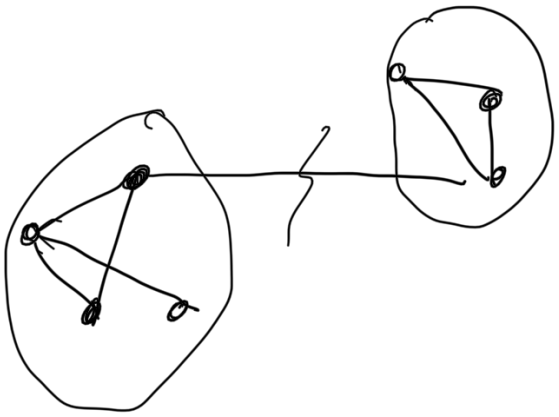
$$X = \begin{bmatrix} 3 \\ 4 \\ 1 \\ 2 \end{bmatrix}$$

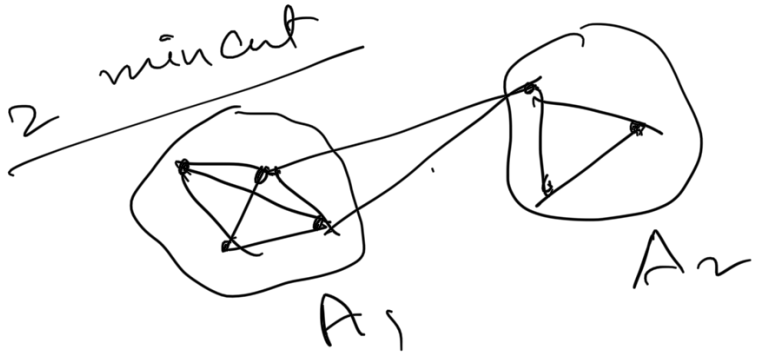
$$sim(\ ) = \frac{1 - euc(\ )}{euc(\ )}$$

$$S = \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & -2 & -1 \\ -1 & -2 & 1 & 0 \\ 0 & -1 & 0 & 1 \end{bmatrix}$$

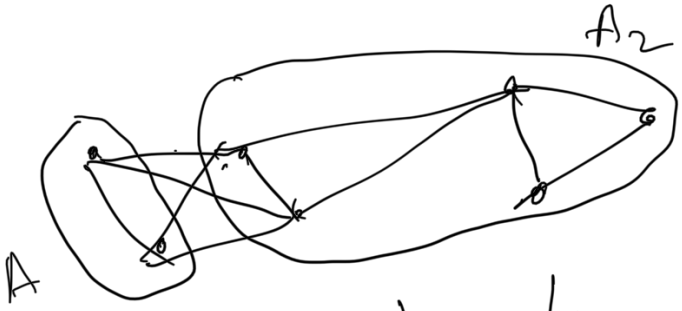
$$W = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & & 0 & \\ 0 & & & 0 \end{bmatrix}$$



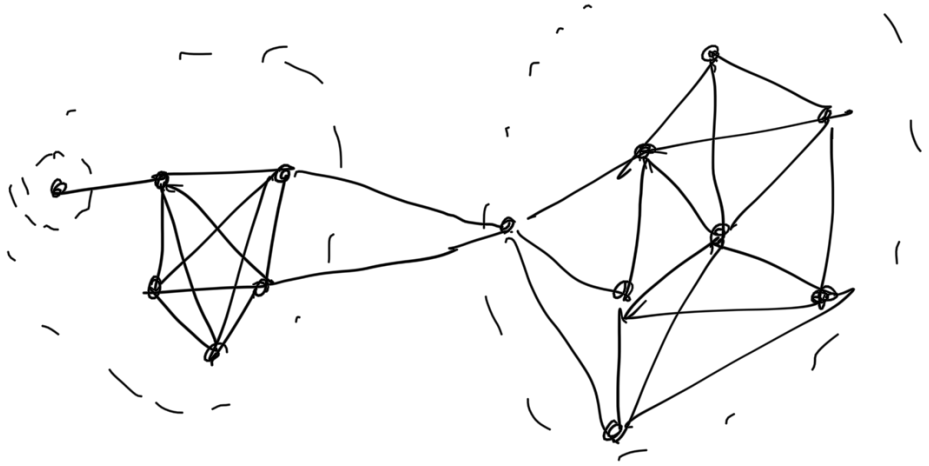



2 mincut
A1
A2

$Cut(A_1, A_2) = 2$



$Cut(A_1, A_2) = 4$



$W_{N \times N}$ — adjacency matrix

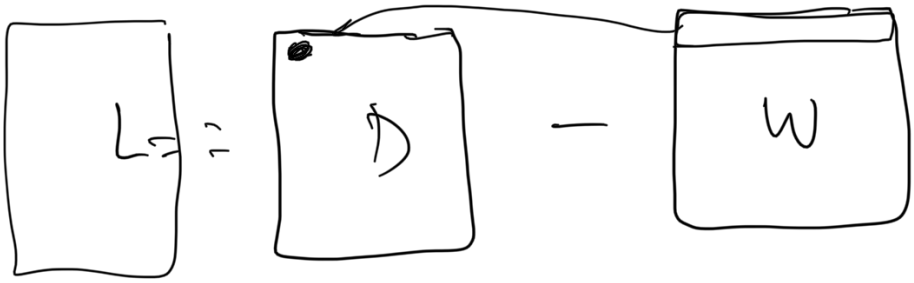
$D_{N \times N}$ — diagonal matrix

$$D_{ii} = \sum_{j=1}^{N} W_{ij}$$

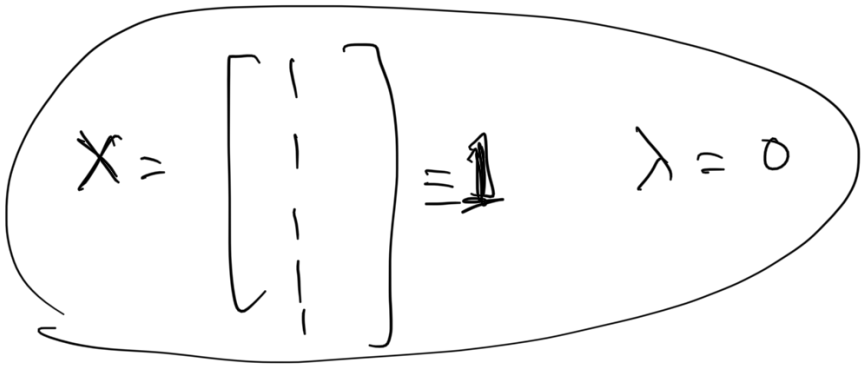
$$L = D - W$$

↑ — matrix.

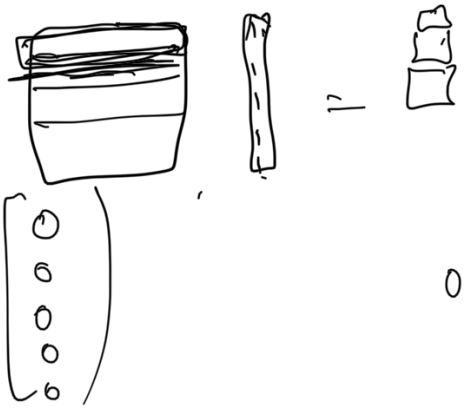
Laplacian Matrix



$x = (N \times 1)$ λ - scalar



L1



$W =$

	1	2	3	4	5
1	0	1	1	0	0
2	1	0	1	0	0
3	1	1	0	0	0
4	0	0	0	0	1
5	0	0	0	1	0

$D =$

$$\begin{bmatrix} 2 & & & & \\ & 2 & & & \\ & & 2 & & \\ & & & 1 & \\ & & & & 1 \end{bmatrix}$$

$$L = D - W = \begin{bmatrix} 2 & -1 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 \\ -1 & -1 & 2 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & -1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} \neq 0 \\ \neq 0 \\ \neq 0 \\ 0 \\ 0 \end{bmatrix} \quad 0 =$$

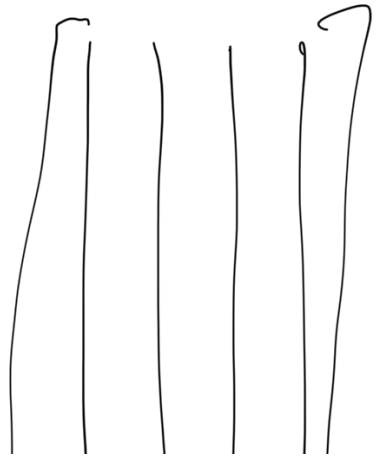
$$\begin{bmatrix} 0 \\ 0 \\ 0 \\ \neq 0 \\ \neq 0 \end{bmatrix} \quad 0 =$$

4

$N = 10$

0
0.3
0.2
0.25
3.4
3.8

N



3.9
4.7
5.2
8.0