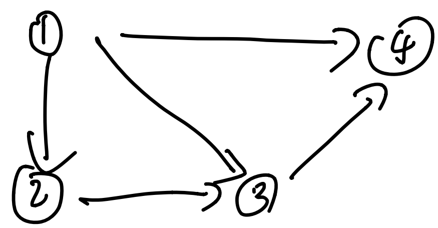
Application of Linear Algebra

Graph: (可类比为电流中的电势差)



nodes = 4

edges = 5

$$A = \begin{bmatrix} -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ -1 & 0 & 1 & 0 \\ -1 & 0 & 0 & 1 \\ 0 & 0 & -1 & 1 \end{bmatrix}$$ (-1代表起点, 1代表终点)

$\underline{N(A): \dim = 1}$, basias: $c\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

$R(A) = 3$

$A^T \cdot y = 0$ 求 $N(A^T)$.

$\dim(A^T) = 2$, what is basis

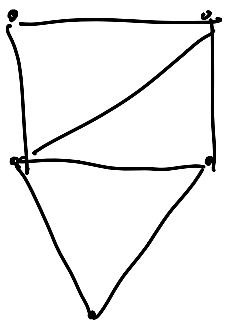
$$A^T = \begin{bmatrix} -1 & 0 & -1 & -1 & 0 \\ 1 & -1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & -1 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{bmatrix} = 0$$

$$\text{basis}: \underbrace{\begin{bmatrix} 1 \\ 1 \\ -1 \\ 0 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 0 \\ 1 \\ -1 \\ 1 \end{bmatrix}}_{\text{two solution}}$$

这证明了基尔霍夫电流定律：流入节点的电流等于流出的电流，节点不存储电荷。

Also talks about Row Space.

$\#nodes - \#edges + \#loops = 1$. 欧拉公式



eg: $5 - 7 + 3 = 1$

$A^T \cdot A$, always symmetric.