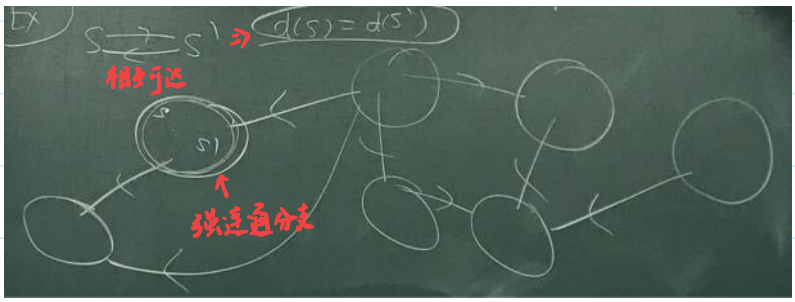
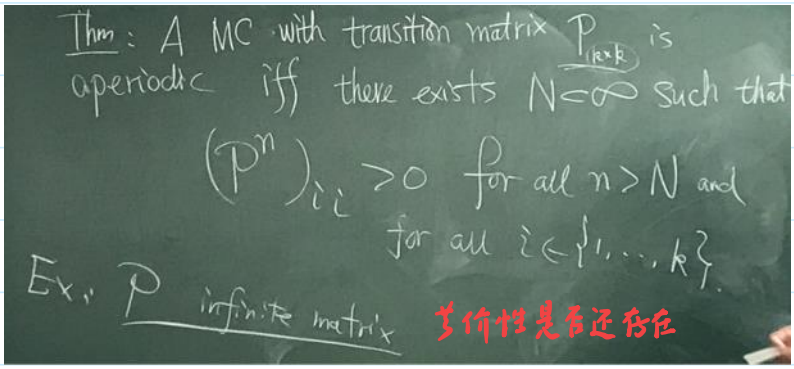
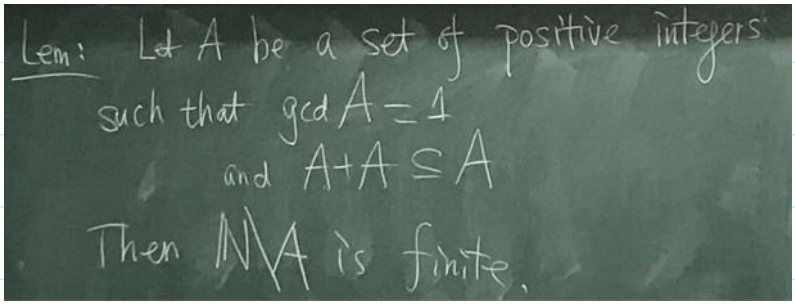


HW

※ **Thm:**



※ **Lem:**



pf:

$1 = \sum x_j a_j$, $a_j \in A$, $x_j \neq 0$

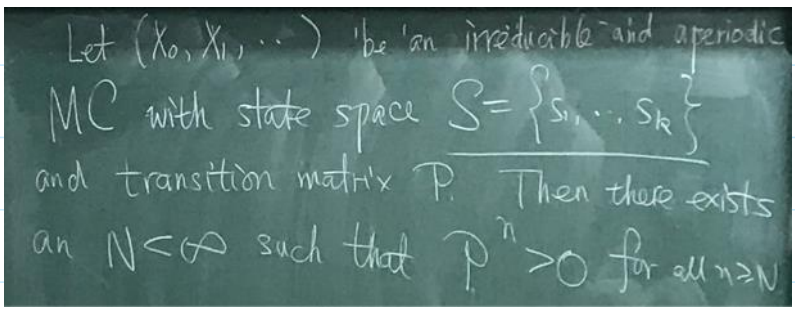
设 $c = \sum |x_j| a_j$, $N = c^2$, $\forall n \geq N$

$n = qc + r$ ($q > c$, $0 \leq r < c$)

$= \sum (q|x_j| + r x_j) a_j$

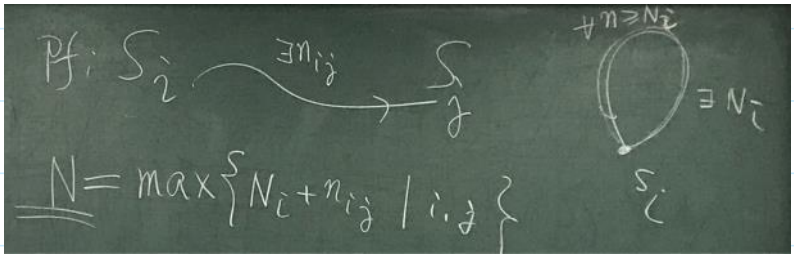
由 Lem. 定义走回步数为 A, N\A 为有限 $i = 1, \dots, k$ 有限 × 有限 $\Rightarrow \exists N < \infty$

⇝



前 Thm 说明非周期导出对角线 > 0

加上非周期则有，所有元素 > 0

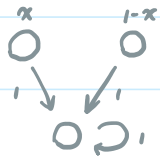


当i可走至j（n_{ij}步）

则先在 S_i 走 $\geq N_i$ 自环

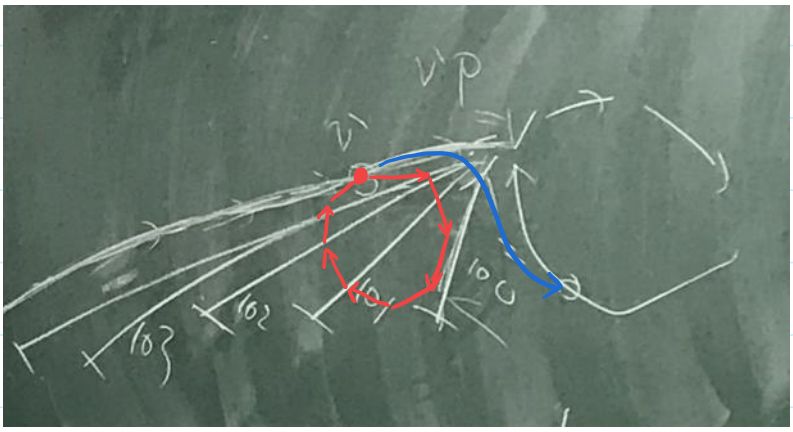
* Markov Chain must have a beginning: $\#\{\beta : \min i,\ \beta P^i = \alpha\}$

$\gcd(d_i) = d$ HW: $\lim_{n\to\infty} P_{ij}^{nd} = \pi_{ij}$ 非周期极限存在



pf: $\nu^{(n)} P^{nd} = \nu \longrightarrow \begin{cases} \nu^{(ni)} \to u \\ P^{nd} \to \pi \end{cases}$ ← 紧集中收敛子序列

$\Rightarrow \nu = u\pi = u\pi P^d = \nu P^d$



若有无限长链，走d步后一定会回到自己

故不存在，但无法否定有无限条有限长链存在