Reminder XIII

- **Configurational model:** Fix $\{p_k\}_{k \in \mathbb{N}}$ a degree probability distribution, fix n = # vertices, create $n p_k$ vertices with k stubs, connect the stubs at random.

  ⇝ density of loops $\sim \frac{1}{n}$, density of double edges $\sim \frac{1}{n}$

- Degree distribution of neighbour $\neq$ degree distribution of arbitrary vertex $\Rightarrow \mathbb{E}(\text{degree } y \sim x) > \mathbb{E}(\deg(x))$

  "Your friend has more friends than an arbitrary person"

- $\mathbb{E}(C) \sim \frac{1}{n}$ ... ← clustering coefficient — still decaying too fast for many applications.

- Use of configuration model for community detection:

  Define $B_{jk} := a_{ij} - \frac{k_i k_j}{2m}$ for $i, j \in V$, $m := |E|$,

  Let $\ell \in \{-1, 1\}^n \subset \mathbb{R}^n$, $\|\ell\|^2 = n$. Look for extremum of ${}^T\ell B \ell$ under constraint) ⇝ Lagrange multiplier

  ⇝ Eigenvalue/eigenvector problem: approximate solution for 2 communities.