Homework 1

Xuyao Gao

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Problem 1:

1.$det(\boldsymbol{I} - \alpha \boldsymbol{A}) \neq 0$, $\alpha \neq \frac{1}{\lambda_i}$

2. To keep the centrality of nodes non-negative, $\alpha < \frac{1}{\lambda_0}$, λ_0 is the largest eigenvalue of $\boldsymbol{A}$.

Problem 2:

If two vertexes v_i and v_j have common neighbors v_ks, they are connected by walks size 2 from v_i to v_j through v_k, so

$|N(v_i) \bigcap N(v_j)| = N_{ij}^{(2)}$

Problem 3:

See jupyter notebook.