21-484 Notes

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2 Cvátal Erdős $\alpha(G) \leq \kappa(G)$

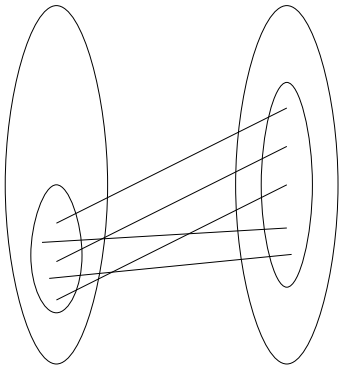
4 Take a maximum cycle

3 Find one

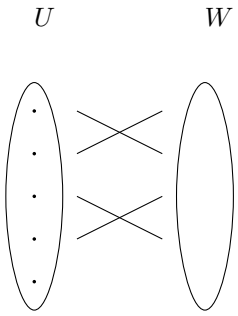
1 Ore: $\forall u, v$ non-adjacent $\deg(u) + \deg(v) \geq n$

$r = |U| \leq |W|$. G has a matching of cardinality r iff

$$\forall S \subseteq, |N(S)| \geq |S|$$

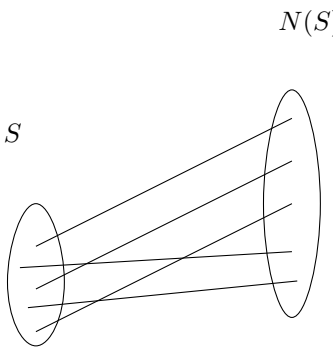


G is d-regular



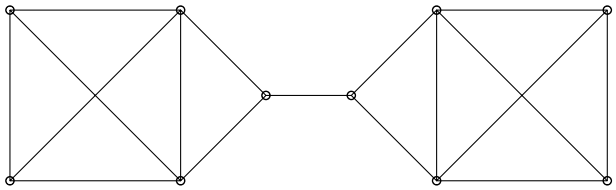
$$\begin{aligned}
\sum_{u \in U} \deg(u) &= \sum_{v \in W} \deg(v) \\
\sum_{u \in U} d &= \sum_{v \in W} d \\
|U|d &= |W|d \\
|U| &= |W|
\end{aligned}$$

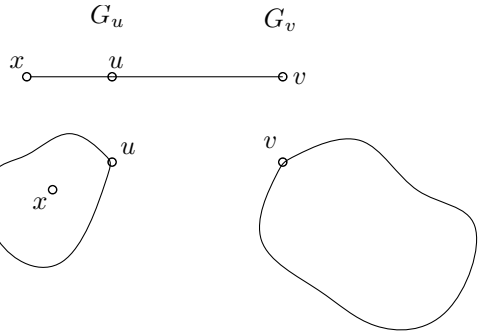
Let $S \subseteq U$

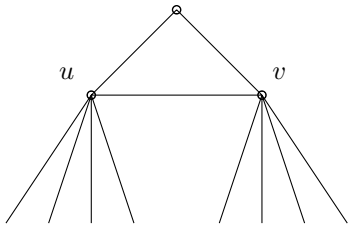


$$\begin{aligned}
\sum_{u \in S} \deg(u) &= \sum_{v \in N(S)} \deg(v) \\
\sum_{u \in S} d &\leq \sum_{v \in N(S)} d \\
|S| \cdot d &\leq |N(S)| \cdot d \\
|N(S)| &\geq |S|
\end{aligned}$$

$$\delta(G) \geq \kappa(G)$$



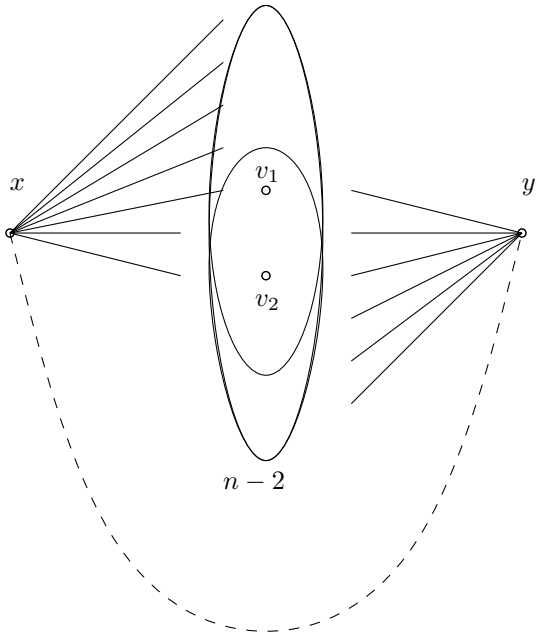




G $n \geq 3$

deg $(V) \geq n/2$

nonseparable



2 internally disjoint paths

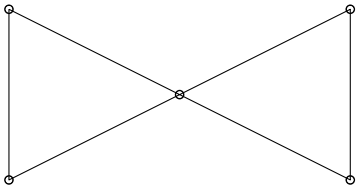
Mengers $\Rightarrow$ nonseparable.

G $n \geq 3$

$(n-1)$–Connected

G is K_n

Whitney's Theorem: $\kappa(G) \leq \lambda(G) \leq \delta(G)$



$1 + \kappa(G) = \lambda(G)$

Menger's Theorem

Fan Lemma