GRADUATE SEMINAR

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Intersecting family of permutations

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Abstract: The *Erdős-Ko-Rado* (EKR) theorem is a classical result in extremal combinatorics. It states that if n and k are such that $n \geq 2k$, then any intersecting family $\mathcal{F}$ of k-subsets from $[n] = \{1, 2, \ldots, n\}$ has size at most $\binom{n-1}{k-1}$. Moreover, if $n > 2k$, then equality holds if and only if $\mathcal{F}$ is *canonical*; that is, $\bigcap_{A \in \mathcal{F}} A = \{i\}$, for some $i \in [n]$.

The EKR theorem can be extended to permutation groups. Let G be a permutation group of degree n. Two permutations $\sigma, \tau \in G$ are called *t-setwise intersecting* if there exists $S \in \binom{[n]}{t}$ such that $S^\sigma = S^\tau$. The group G is said to have the *t-setwise intersecting property* if for any family $\mathcal{F}$ of t-setwise intersecting permutations, $|\mathcal{F}| \leq \frac{|G|}{\binom{n}{t}}$.

I will talk about the 1-setwise intersecting property of transitive groups. I will focus in particular on intersecting properties of the automorphism group $\mathrm{Aut}(X)$ of a vertex-transitive graph $X = (V, E)$ acting on its vertex-set $V(G)$. I will also prove that $\mathrm{Sym}(n)$ has the 2-setwise intersecting property provided $n \geq 2$.

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