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An Erdős-Ko-Rado theorem for 2-Transitive Groups

The *derangement graph* for a group G is a Cayley graph on G with connection set the set of all derangements in G (these are the elements with no fixed points). The eigenvalues of the derangement graph can be calculated using the irreducible characters of the group. The eigenvalues can give information about the graph, I am particularly interested in applying Hoffman's ratio bound to bound the size of the cocliques in the derangment graph for 2-transitive groups.

This is of intersect since it can be used to prove a version of the Erdős-Ko-Rado theorem for 2-transitive groups. Two permutations are said to be *intersecting* if the permutations both map some i to some j. A set of permutations is *intersecting* if any two permutations in the set are intersecting. The stabilizer of a point (or any coset of the stabilizer of a point) is an intersecting set.

The derangement graph of a group G is defined so that the cocliques are exactly the sets of intersecting permutations from G. I will outline how Hoffman's ratio bound on the derangement graphs for 2-transitive graphs can be used to show that the largest set of intersecting permutations from a 2-transitive group is no larger than the stabilizer of a point. I will also present a conjectures about the structure of the cocliques in the derangement graphs for 2-transitive groups.