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Big Symmetric Groups, and Related Problems in Analysis, Probability and Combinatorics

We discuss the asymptotics of functions on the symmetric groups S_n and their duals, in the limit of large degree $n \to \infty$. In particular, we deal with:

(a) maximal dimensions of irreducible representations;

(b) the limiting measure for uniform distributions on S_n;

(c) the asymptotics of Plancherel measures on the dual sets $\widehat{S}_n$ of irreducible representations of S_n;

(d) approximations of characters of the infinite symmetric group S_∞.

Combinatorial problems related to big permutations frequently exhibit unexpected connections with analysis. In this direction, we mention the Martin boundary construction for abstract graphs, the asymptotics of interlacing roots of orthogonal polynomials, the typical spectra of big hermitian matrices.

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