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Determinants of Random Matrices and Jack Polynomials of Rectangular Shape

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Abstract We consider an N-dimensional real integral, indexed by a parameter that specifies the power of a Vandermonde determinant. For two particular values of the parameter, this integral arises from matrix integrals, over real symmetric and complex Hermitian $N \times N$ matrices. When it is normalized, it gives the expectation of a an arbitrary power of the determinant. The results are given as finite summations, using terminating hypergeometric series. We relate the integral to a specific coefficient in the Jack polynomial indexed by a partition of rectangular shape, and present data for this coefficient in terms of the parameter α.