

Zeons and Combinatorial identities

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Abstract

We show that the ordinary derivative of a real analytic function of one variable can be realized as a Grassmann-Berezin-type integration over the Zeon algebra, the Z-integral. As a by-product of this representation, we give show how zeons can be employed to obtain properties of combinatorial objects. Particularly, we give new proofs of the Faà di Bruno formula and Spivey's identity. The approach described here is suitable to accommodate new Z-integral representations including Stirling numbers of the first and second kind, Bell, central Delannoy, Euler, Fibonacci, and Genocchi numbers, and the special polynomials of Bell, generalized Bell, Bernoulli, Hermite, and Laguerre.