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Bounds for Zeta and Related Functions

Abstract:

Sharp bounds are obtained for expressions involving Zeta and related functions at a distance of one apart. Since Euler discovered in 1736 a closed form expression for the Zeta function at the even integers, a comparable expression for the odd integers has not been forthcoming. The current article derives sharp bounds for the Zeta, Lambda and Eta functions at a distance of one apart. The methods developed allow an accurate approximation of the function values at the odd integers in terms of the neighbouring known function at even integer values. The Dirichlet Beta function which has explicit representation at the odd integer values is also investigated in the current work.

Cebysev functional bounds are utilised to obtain tight upper bounds for the Zeta function at the odd integers.

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