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Extension of relations for entire functions of exponential type to wider classes

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There are various relations (formulae and inequalities) that hold for entire functions of exponential type σ, say, but are no longer valid outside this class. However, when a function f is in some sense close to an entire function of exponential type σ, one may expect that the corresponding relation is not violated drastically. It should hold with an error that involves the deviation of f from an entire function of exponential type σ.

We establish extensions of this kind. Our considerations include the classical sampling formula by Whittaker-Kotel'nikov-Shannon, the trapezoidal rule on $\mathbb{R}$, the reproducing kernel formula, Boas' differentiation formula, Bernstein's inequality for derivatives and Nikolskii's inequality estimating the $l^2(\mathbb{Z})$ norm in terms of the $L^2(\mathbb{R})$ norm.

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