



NEW DOUBLE INEQUALITIES OF $\Gamma(x)$

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Abstract

In this paper, we deduce double inequalities of the gamma function of the form

$$\sqrt{2\pi}x^{x-1/2}e^{-x}\frac{P_1x}{Q_1x} < \Gamma(x) < \sqrt{2\pi}x^{x-1/2}e^{-x}\frac{P_2(x)}{Q_2(x)},$$

where $P_1(x)$, $P_2(x)$, $Q_1(x)$ and $Q_2(x)$ are polynomials of the same degree. Also, we recover the asymptotic properties of certain sequences related to Stirling's approximation for the gamma function presented in [E. Artin, The Gamma Function, Translated by M. Butler, Holt, Rinehart and Winston, New York, 1964] with different proof.

Keywords and phrases: gamma function, Stirling' series, Fourier series, asymptotic expression.

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