

Title: On the equality of generalized quasi-arithmetic means

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Given a continuous strictly monotone function $\varphi : I \rightarrow \mathbb{R}$ and a probability measure μ on the Borel subsets of $[0, 1]$, the two variable mean $M_{\varphi, \mu} : I^2 \rightarrow I$ is defined by

$$M_{\varphi, \mu}(x, y) := \varphi^{-1} \left(\int_0^1 \varphi(tx + (1-t)y) d\mu(t) \right) \quad (x, y \in I).$$

This class of means includes quasi-arithmetic as well as Lagrangian means. The aim of this paper is to study their equality problem, i.e., to characterize those pairs (φ, μ) and (ψ, ν) such that

$$M_{\varphi, \mu}(x, y) = M_{\psi, \nu}(x, y) \quad (x, y \in I)$$

holds. Under at most fourth-order differentiability assumptions for the unknown functions φ and ψ , a complete description of the solution set of the above functional equation is obtained.

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