



Volume 6, Issue 2, Article 38

A Refinement of Jensen's Inequality

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Keywords: Product measure, Fubini's Theorem, Jensen's inequality.
Date Received: 27/08/04
Date Accepted: 16/03/05
Subject Codes: Primary: 26D15, 28A35.
Editors: [Charles E. M. Pearce](#),

Abstract: We refine Jensen's inequality as

$$\varphi \left(\int_X f d\mu \right) \leq \int_Y \varphi \left(\int_X f(x)\omega(x,y) d\mu(x) \right) d\lambda(y) \leq \int_X (\varphi \circ f) d\mu,$$

where (X, \mathcal{A}, μ) and $(Y, \mathcal{B}, \lambda)$ are two probability measure spaces, $\omega : X \times Y \rightarrow [0, \infty)$ is a weight function on $X \times Y$, I is an interval of the real line, $f \in L^1(\mu)$, $f(x) \in I$ for all $x \in X$ and φ is a real-valued convex function on I .



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