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Outer γ -Convex Functions on a Normed Space

Authors: [Phan Thanh An,](#)

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Abstract: For some given positive γ , a function f is called outer γ -convex if it satisfies the Jensen inequality $f(z_i) \leq (1 - \lambda_i)f(x_0) + \lambda_i f(x_1)$ for some $z_0 := x_0, z_1, \dots, z_k := x_1 \in [x_0, x_1]$ satisfying $\|z_i - z_{i+1}\| \leq \gamma$, where $\lambda_i := \|x_0 - z_i\| / \|x_0 - x_1\|, i = 1, 2, \dots, k - 1$. Though the Jensen inequality is only required to hold true at some points (although the location of these points is uncertain) on the segment $[x_0, x_1]$, such a function has many interesting properties similar to those of classical convex functions. Among others it is shown that, if the infimum limit of an outer γ -convex function attains $-\infty$ at some point then this propagates to other points, and under some assumptions, a function is outer γ -convex iff its epigraph is an outer γ -convex set.

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