Journal of Convex Analysis 31 (2024) 779–786

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# A Property of Strictly Convex Functions which Differ from each other by a Constant on the Boundary of their Domain

We prove, in particular, the following result: Let $E$ be a reflexive real Banach space and let $C \subset E$ be a closed convex set, with non-empty interior, whose boundary is sequentially weakly closed and non-convex. Then, for every function $\varphi : \partial C \to \mathbf{R}$ and for every convex set $S \subseteq E^*$ dense in $E^*$, there exists $\tilde{\gamma} \in S$ having the following property: for every strictly convex lower semicontinuous function $J : C \to \mathbf{R}$, Gâteaux differentiable in $\mathrm{int}(C)$, such that $J_{|\partial C} - \varphi$ is constant in $\partial C$ and $\lim_{\|x\|\to+\infty} (J(x)/\|x\|) = +\infty$ if $C$ is unbounded, $\tilde{\gamma}$ is an algebraically interior point of $J'(\mathrm{int}(C))$ (with respect to $E^*$).

**Keywords**: Strictly convex function, derivative, minimax.

**MSC**: 52A41, 26B25, 46G05, 47J05.