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Convex Sets and Minimal Sublinear Functions

We show that, given a closed convex set K containing the origin in its interior, the support function of the set $\{y \in K^* \mid \text{there exists } x \in K \text{ such that } \langle x, y \rangle = 1\}$ is the pointwise smallest among all sublinear functions σ such that $K = \{x \mid \sigma(x) \leq 1\}$.