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On Semicontinuity of Convex-Valued Multifunctions and Cesari's Property (Q)

We investigate two types of semicontinuity for set-valued maps, Painlevé-Kuratowski semicontinuity and Cesari's property (Q). It is shown that, in the context of convex-valued maps, the concepts related to Cesari's property (Q) have better properties than the concepts in the sense of Painlevé-Kuratowski. In particular we give a characterization of Cesari's property (Q) in terms of upper semicontinuity of a family of scalar functions $\sigma_{f(\,\cdot\,)}(y^*)\colon X \to \overline{\mathbb{R}}$, where $\sigma_{f(x)}\colon Y^* \to \overline{\mathbb{R}}$ is the support function of the set $f(x)$. We compare both types of semicontinuity and show their coincidence in special cases.

Keywords: Semi-continuity, set-valued maps, property (Q).

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