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A Lower Semicontinuous Regularization for Set-Valued Mappings and its Applications

A basic fact in real analysis is that every real-valued function f admits a lower semicontinuous regularization \underline{f} , defined by means of the lower limit of f :

$$\underline{f}(x) := \liminf_{y \rightarrow x} f(y).$$

This fact breaks down for set-valued mappings. In this note, we first provide some counterexamples. We try further to define a kind of lower semicontinuous regularization for a given set-valued mapping and we point out some general applications.

Keywords: Set-valued mappings, lower semicontinuity, regularization, approximate selections, fixed points, differential inclusions, variational inequalities.

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