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Integrability of Pseudomonotone Differentiable Maps and the Revealed Preference Problem

The problem considered is as follows: given $C \subset \mathbb{R}^n$ and $F : C \to \mathbb{R}^n$ differentiable, find $f : C \to \mathbb{R}$ differentiable such that $||\nabla f(x)||^{-1}\nabla f(x) = ||F(x)||^{-1}F(x)$ for all $x \in C$. Conditions for f to be pseudoconvex or convex are given. The results are applied to the differentiable case of the revealed preference problem.