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Some Calculus Rules in Variational Analysis

In the modern variational analysis some constructions such as basic normals, subgradients, and coderivatives are defined in dual spaces via sequential weak star limits, which have a variety of nice properties in the general Banach spaces setting. A partial second-order subdifferential is defined here for extended real valued functions of two variables corresponding to its variables through coderivatives of first-order partial subdifferential mappings. In addition, some rules are presented to calculate these second-order structures along with defining some conditions to insure the equality ∂^2_{yx} and ∂^2_{xy}. Moreover, as an application, some conditions are stated which show the relation between local minimum of a function and positiveness of principal minors of its hessian matrix.