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   Soggetti   Difference equations
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   Nota di contenuto Introduction -- Regular Solutions of Some Functional Equations -- The
                     Leibniz Rule -- The Chain Rule -- Stability and Rigidity of the Leibniz
                     and the Chain Rules -- The Chain Rule Inequality and its Perturbations
                     -- The Second-Order Leibniz rule -- Non-localization Results -- The
                     Second-Order Chain Rule -- Bibliography -- Subject Index -- Author
                     Index.

   Sommario/riassunto This monograph develops an operator viewpoint for functional
                     equations in classical function spaces of analysis, thus filling a void in
                     the mathematical literature. Major constructions or operations in
                     analysis are often characterized by some elementary properties,
                     relations or equations which they satisfy. The authors present recent
                     results on the problem to what extent the derivative is characterized by
                     equations such as the Leibniz rule or the Chain rule operator equation
                     in C^k-spaces. By localization, these operator equations turn into
                     specific functional equations which the authors then solve. The second
                     derivative, Sturm-Liouville operators and the Laplacian motivate the

study of certain "second-order" operator equations. Additionally, the authors determine the general solution of these operator equations under weak assumptions of non-degeneration. In their approach, operators are not required to be linear, and the authors also try to avoid continuity conditions. The Leibniz rule, the Chain rule and its extensions turn out to be stable under perturbations and relaxations of assumptions on the form of the operators. The results yield an algebraic understanding of first- and second-order differential operators. Because the authors have chosen to characterize the derivative by algebraic relations, the rich operator-type structure behind the fundamental notion of the derivative and its relatives in analysis is discovered and explored. The book does not require any specific knowledge of functional equations. All needed results are presented and proven and the book is addressed to a general mathematical audience.