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Title: Support theorems in abstract settings

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In this paper, we establish a general framework in which the verification of support theorems for generalized convex functions acting between an algebraic structure and an ordered algebraic structure is still possible. As for the domain space, we allow algebraic structures equipped with families of algebraic operations whose operations are mutually distributive with respect to each other. We introduce several new concepts in such algebraic structures, the notions of convex set, extreme set, and interior point with respect to a given family of operations, furthermore, we describe their most basic and required properties. In the context of the range space, we introduce the notion of completeness of a partially ordered set with respect to the existence of the infimum of lower bounded chains, we also offer several sufficient conditions which imply this property. For instance, the order generated by a sharp cone in a vector space turns out to possess this completeness property. By taking several particular cases, we deduce support and extension theorems in various classical and important settings.

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