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Generalized monotone functions in measure spaces.

Monotone functions over the real numbers are very well-behaved compared to general measurable functions. Consequently, a wide variety of techniques and applications are in place for working with them. In this talk, we explore the notion of an ordered core, which allows us to define core decreasing functions and generalize monotone functions to general measure spaces without reliance on a strict ordering among elements.

Through various examples, we illustrate the versatility and adaptability of this generalized perspective on decreasing functions. Furthermore, we demonstrate its practical utility by exploring its connection to the study of abstract Hardy's inequalities. This approach provides a uniform treatment of many different types of Hardy operators. In particular, we use the theory of core decreasing functions to prove a new characterization for the boundedness of an abstract Hardy operator between L^1 to L^q with general measures.