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Some Whitney extension problems in valuation theory

Consider smooth, translation-invariant valuations on convex bodies. Assume that a collection of valuations is given on a family S of subspaces of \mathbb{R}^n . Are they the restrictions of a single valuation? Clearly, compatibility of the given data on intersections is a necessary condition. Is it sufficient? We will discuss several distinct instances of this problem, whence it acquires distinct flavors. When S is the whole k -grassmannian, and the valuations j -homogeneous, we will see that the condition is sufficient, provided $k - j > 1$. This can be seen as a dimensional localization of the phase transition from densities to valuations. In another setting, where S consists of pairwise non-intersecting subspaces, we again establish a positive answer. As a corollary, we will deduce a Nash embedding theorem for smooth valuations on manifolds, which in turn has integral-geometric consequences in this setting. Finally, we will consider the setting of finite generic families of subspaces, giving rise to a surprising extension phenomenon. Based on a joint work with Georg Hofstaetter.