THE KEMPERMAN INVERSE PROBLEM

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Abstract:

Let G be a connected locally compact group with a left Haar measure μ, and let $A,B \subseteq G$ be nonempty and compact. Assume further that G is unimodular, i.e., μ is also the right Haar measure; this holds, e.g., when G is compact, a nilpotent Lie group, or a semisimple Lie group. In 1964, Kemperman showed that

$$ \mu(AB) \geq \min \{\mu(A)+\mu(B), \mu(G)\} .$$

The Kemperman inverse problem (proposed by Griesmer, Kemperman, and Tao) asks when the equality happens or nearly happens. I will discuss the recent solution of this problem, highlighting the roles played by model theory and descriptive set theory. (Joint with Jinpeng An, Yifan Jing, and Ruixiang Zhang)