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Title: Around the Banach-Tarski paradox

Abstract: For two bounded subsets with non-empty interior of 3-dimensional Euclidean space, one of them can be partitioned into finite pieces such that the other can be constructed by moving the pieces. It is possible for two solid balls with different radii, so it is a paradox, which was established by Banach and Tarski. But it is not a contradiction, because the pieces can be non-measurable. On the other hand, the paradox is not valid on 2-dimensional Euclidean space. In particular, Lebesgue measure on 2-dimensional Euclidean space can be extended to all subsets such that the extended measure satisfies finite additivity. The essential difference of 3-dimensional and 2-dimensional Euclidean spaces is whether the congruence transformation groups on them have free subgroups of rank 2 or not. In this talk, paradoxes and around will be considered.