Avoiding rational distances

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We'll show that every set of reals X has a subset Y such X and Y have same Lebesgue outer measure and the distance between any two points in Y is irrational. This answers a question of Komjáth in dimension one.

References

[1] P. Komjáth, Set theoretic constructions in Euclidean spaces, New Trends in Discrete and Computational Geometry (J. Pach, ed.), Springer, 1993, 303-325

[2] A. Kumar, Avoiding rational distances, Real Analysis Exchange, Vol. 38, No. 2, 2012/2013, 493-498, Also available at http://www.math.wisc.edu/∼akumar/

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