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zonotope

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A *zonotope* is a polytope which can be obtained as the <http://planetmath.org/MinkowskiSum3> sum of finitely many closed line segments in \mathbb{R}^n . Three-dimensional zonotopes are also sometimes called *zonohedra*. Zonotopes are dual to finite hyperplane arrangements. They are centrally symmetric, compact, convex sets.

For example, the unit n -cube is the Minkowski sum of the line segments from the origin to the standard unit vectors e_i for $1 \leq i \leq n$. A hexagon is also a zonotope; for example, the Minkowski sum of the line segments based at the origin with endpoints at $(1, 0)$, $(1, 1)$, and $(0, 1)$ is a hexagon. In fact, any projection of an n -cube is a zonotope.

The prism of a zonotope is always a zonotope, but the pyramid of a zonotope need not be. In particular, the <http://planetmath.org/HomologyTopologicalSpace> n -simplex is only a zonotope for $n \leq 1$.

References

- [1] Billera, L., R. Ehrenborg, and M. Readdy, *The **cd**-index of zonotopes and arrangements*, in *Mathematical essays in honor of Gian-Carlo Rota*, (B. E. Sagan and R. P. Stanley, eds.), Birkhuser, Boston, 1998, pp. 23–40.
- [2] Ziegler, G., *Lectures on polytopes*, Springer-Verlag, 1997.