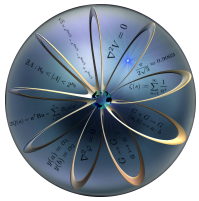

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ellipsoid

Canonical name	Ellipsoid
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Related topic	VolumeOfEllipsoid

An *ellipsoid* is a subset of $\mathbb{R}^3$ consisting of points $(x, y, z) \in \mathbb{R}^3$ such that

$$\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 + \left(\frac{z}{c}\right)^2 = 1$$

for some $a, b, c > 0$.

Properties

1. If $a = b = c$, the ellipsoid reduces to a sphere.
2. If we fix the value of any of x, y, z to some constant, say $x = C$, we obtain an ellipse in the plane (C, y, z).
3. The ellipse determined by a, b, c is the unit sphere of the norm

$$\|v\| = v^T \operatorname{diag}(\frac{1}{a}, \frac{1}{b}, \frac{1}{c})v, \quad v = (x, y, z)^T.$$