



Math for the people, by the people.

star-shaped region

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Definition A subset U of a real (or possibly complex) vector space is called *star-shaped* if there is a point $p \in U$ such that the line segment \overline{pq} is contained in U for all $q \in U$. (Here, $\overline{pq} = \{tp + (1-t)q \mid t \in [0, 1]\}$.) We then say that U is star-shaped with respect to p .

In other , a region U is star-shaped if there is a point $p \in U$ such that U can be “collapsed” or “contracted” p .

0.0.1 Examples

1. In \mathbb{R}^n , any vector subspace is star-shaped. Also, the unit cube and unit ball are star-shaped, but the unit sphere is not.
2. A subset U of a vector space is star-shaped with respect to all of its points if and only if U is convex.