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## Definition

A *convex set* contains every closed line segment between any two points. Every affine set is convex.

## Notation

Let  $x$  and  $y$  in  $\mathbf{R}^n$ . We can express the closed line segment between  $x$  and  $y$  as

$$\{x + a(y - x) \mid 0 \leq a \leq 1, x, y \in \mathbf{R}^n\}.$$

Notice that  $x + a(y - x) = (1 - a)x + ay$ .

**Prop. 1.** *Every affine set is convex.*

**Prop. 2.** *The intersection of a family of convex sets is convex.*

**Prop. 3.** *The translate of a convex set is convex. The scalar multiple of a convex set is convex.*

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<sup>1</sup>Future editions will include.



