



## AFFINE SETS

### Why

#### Definition

The *line through* two points in  $n$ -dimensional space is the set of points which can be expressed as the sum of the first point and a scaled multiple of the difference between the second point and the first. An *affine set* is a subset of  $n$ -dimensional space which contains the lines through each of its points.

#### Examples

The empty set is trivially an affine set. The entire set of points in  $n$ -dimensional space is an affine set. Any singleton is an affine set.

#### Notation

The *line through* two points  $x$  and  $y$  in  $\mathbf{R}^n$  is the set

$$\{x + a(y - x) \mid a \in \mathbf{R} \text{ and } x, y \in \mathbf{R}^n\}.$$

Notice that the expression  $x + a(y - x)$  is equivalent to  $(1 - a)x + ay$ .

#### Other Terminology

Some authors call affine sets *affine varieties*, *linear varieties* or *flat*.

**PROPOSITION 1.** *The intersection of a family of affine sets is affine.*

