



Definition

Given two distinct points $x \neq y$ in \mathbf{R}^n , the *line* through x and y is the set of points expressable as the sum of x and $\alpha(y - x)$ where $\alpha \in \mathbf{R}$.

In other words, the line through x and y is

$$\{z \in \mathbf{R}^n \mid \exists \alpha \in \mathbf{R}, z = x + \alpha(y - x)\}.$$

Notice that if $z = x + \alpha(x - y)$, then

$$z = (1 - \alpha)x + \alpha y,$$

where $\alpha \in \mathbf{R}$ and $x, y \in \mathbf{R}^n$.

Notation

We denote the line through x and y by $L(x, y)$.

