



## REAL VECTORS

### Why

A point in  $\mathbf{R}^n$  is also called a vector in  $\mathbf{R}^n$ , since  $\mathbf{R}^n$  with the usual operations of element-wise addition and element-wise scalar multiplication is a vector space.

### Result

For  $x, y \in \mathbf{R}^n$ , define  $x + y$  by

$$(x_1 + y_1, \dots, x_n + y_n)$$

and for  $\alpha \in \mathbf{R}$ , define  $\alpha \cdot x$

$$(\alpha x_1, \dots, \alpha x_n).$$

**Proposition 1.**  $\mathbf{R}^n$  is a vector space of dimension  $n$  over  $\mathbf{R}$  with  $+$  and  $\cdot$ .

For this reason, we call elements of  $\mathbf{R}^n$  (*real*) *vectors*.



