



**Definition**

A *real linear transformation* is a function  $f : \mathbf{R}^n \rightarrow \mathbf{R}^m$  satisfying

$$f(\alpha x + \beta y) = \alpha f(x) + \beta f(y) \quad \text{for all } x, y \in \mathbf{R}^n \text{ and } \alpha, \beta \in \mathbf{R}$$

Equivalently,  $f$  is (a) *homogenous*  $f(\alpha x) = \alpha f(x)$  and (b) *additive*  $f(x + y) = f(x) + f(y)$ .



