



**Definition**

Given nonzero  $x \in \mathbf{R}^n$ , the *half-line* emanating from  $x$  is the set

$$\{\lambda x \mid \lambda \geq 1\}$$

A *ray* through  $x$  or in the direction of  $x$  is the set

$$\{\lambda x \mid \lambda \geq 0\}$$



