



## POSITIVE DEFINITE MATRICES

### Definition

Let  $A \in \mathbf{S}^n$  (i.e.,  $A \in \mathbf{R}^{n \times n}$  and symmetric).  $A$  is *positive definite* if, for all  $x \neq 0 \in \mathbf{R}^d$ ,

$$x^\top Ax > 0.$$

$A$  is *positive semidefinite* (or *nonnegative definite*) if, for all  $x \in \mathbf{R}^d$

$$x^\top Ax \geq 0.$$

### Notation

We denote the set of positive definite  $d$  by  $d$  matrices by  $\mathbf{S}_{++}^d$ . We denote the set of positive semidefinite  $d$  by  $d$  matrices by  $\mathbf{S}_+^d$ .



