

For a vector  $x \in \mathfrak{R}^n$ , the  **$p$ -norm of  $x$** ,  $1 \leq p < \infty$ , is

$$\|x\|_p = \left\{ \sum_i |x_i|^p \right\}^{\frac{1}{p}} .$$

Therefore the 1-norm is

$$\|x\|_1 = \sum_i |x_i|;$$

while taking limits for  $p$  yields the infinity norm

$$\|x\|_\infty = \max_i |x_i|;$$