

# Absolute Value for limit

## 1. Algebraic Definition

1) For every  $x \in \mathbb{R}$ ,  $|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0. \end{cases}$

## 2. Geometric Interpretation

1)  $|x|$  is the distance between  $x$  and  $0$ .

2)  $|x-a|$  is the distance between  $x$  and  $a$ .

## 3. Properties.

For every  $x, y \in \mathbb{R}$ .

1)  $|xy| = |x||y|$

2)  $|x+y| \leq |x| + |y|$

## 4. Equivalent expressions

$$|x-a| < \delta$$

$$\Leftrightarrow -\delta < x-a < \delta$$

$$\Leftrightarrow a-\delta < x < a+\delta$$



