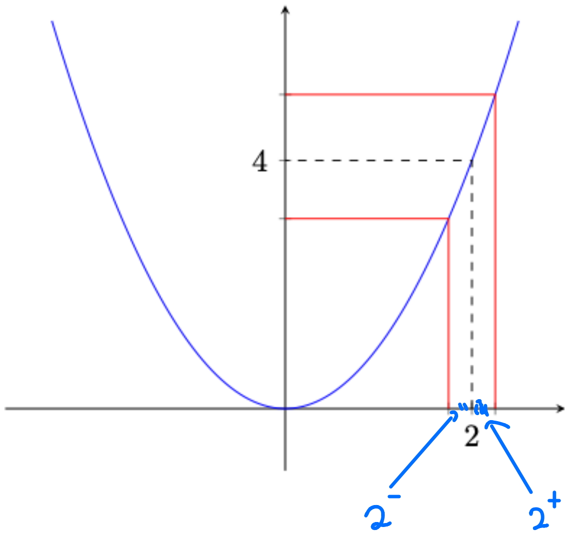
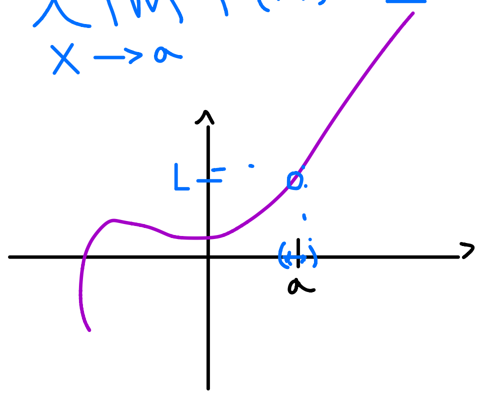
Limits



$$\lim_{x \to 2} x^2 = 4$$

Definition (Informal).
Given a function f : A -> R which is defined in a (small) neighborhood of a (but not necessarily defined at a). Then L is the limit of f(x) when x tends/approaches a if when we substitute values which are very close to a then f(x) is very close to L.

$(x \neq a)$ $\lim_{x \to a} f(x) = L$



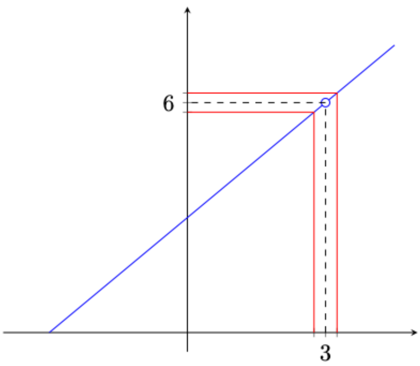
$$\lim_{x \to 2} x^2 = 4$$

Theorem.

Given an elementary function f(x). For every a in the domain of f(x) we have the following:

$$\lim_{x \to a} f(x) = f(a)$$

Ex: $\lim_{x \to -7} \frac{1}{x} = \frac{1}{-7}$



"$\frac{0}{0}$" $\lim_{x \to 3} \frac{x^2 - 9}{x - 3} = 6$

$$\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$$

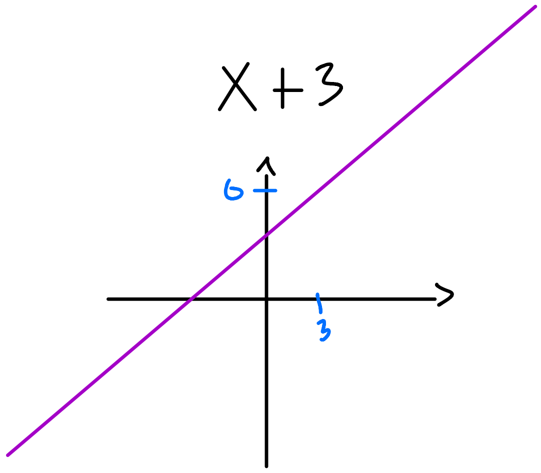
$$= \lim_{x \to 3} \frac{x^2 - 3^2}{x - 3}$$

$$= \lim_{x \to 3} \frac{\cancel{(x-3)} \cdot (x+3)}{\cancel{(x-3)}}$$

$$= \lim_{x \to 3} (x+3)$$

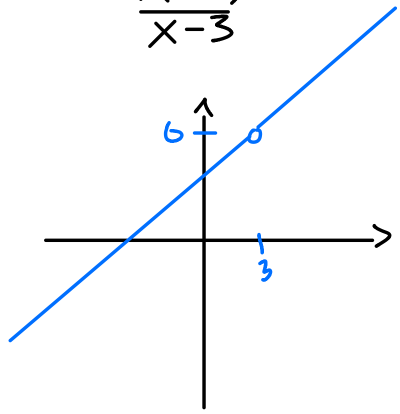
$$= 3 + 3 = 6$$

$x+3$



$\mathbb{R}$

$\frac{x^2-9}{x-3}$



$\{x \mid x \neq 3\} = \mathbb{R} \setminus \{3\}$

Have an amazing day and see you next time !