

Otro límite

$$\begin{aligned} \lim_{x \rightarrow -3} \frac{x^3 + 5x^2 + 3x - 9}{x^3 + 7x^2 + 15x + 9} &= \left(\frac{0}{0}\right) = \lim_{x \rightarrow -3} \frac{(x+3)(x^2 + 2x - 3)}{(x+3)(x^2 + 4x + 3)} = \lim_{x \rightarrow -3} \frac{x^2 + 2x - 3}{x^2 + 4x + 3} = \left(\frac{0}{0}\right) = \\ &= \lim_{x \rightarrow -3} \frac{(x+3)(x-1)}{(x+3)(x+1)} = \lim_{x \rightarrow -3} \frac{x-1}{x+1} = \frac{-4}{-2} = 2 \end{aligned}$$

$$\begin{array}{r|rrrr} & 1 & 5 & 3 & -9 \\ -3 & & -3 & -6 & 9 \\ \hline & 1 & 2 & -3 & 0 \\ -3 & & -3 & 3 & \\ \hline & 1 & -1 & 0 & \\ \hline & & & & \end{array}$$

$$\begin{array}{r|rrrr} & 1 & 7 & 15 & 9 \\ -3 & & -3 & -12 & -9 \\ \hline & 1 & 4 & 3 & 0 \\ -3 & & -3 & -3 & \\ \hline & 1 & 1 & 0 & \\ \hline & & & & \end{array}$$

Cálculo de límites en funciones definidas a trozos.

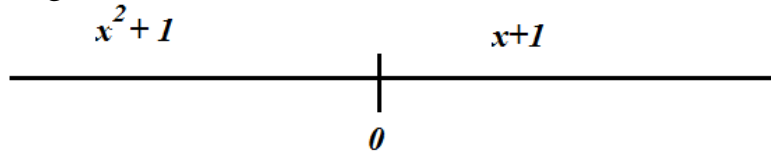
Ejemplo:

$$f(x) = \begin{cases} 2 - x^2 & \text{si } x < -2 \\ 3x - 1 & \text{si } x \geq -2 \end{cases}$$

$$\lim_{x \rightarrow -5} f(x) = \lim_{x \rightarrow -5} (2 - x^2) = 2 - (-5)^2 = -23$$

$$\lim_{x \rightarrow -2} f(x) = \begin{cases} \lim_{x \rightarrow -2^-} f(x) = \lim_{x \rightarrow -2^-} (2 - x^2) = 2 - (-2)^2 = -2 \\ \lim_{x \rightarrow -2^+} f(x) = \lim_{x \rightarrow -2^+} (3x - 1) = 3(-2) - 1 = -7 \end{cases} \quad \text{no } \exists \text{ el límite}$$

$$\lim_{x \rightarrow 1} f(x) = \lim_{x \rightarrow 1} (3x - 1) = 3 \cdot 1 - 1 = 2$$



$$f(x) = \begin{cases} x^2 + 1 & \text{si } x < 0 \\ x + 1 & \text{si } x \geq 0 \end{cases}$$

$$\lim_{x \rightarrow -2} f(x) = \lim_{x \rightarrow -2} (x^2 + 1) = (-2)^2 + 1 = 5$$

$$\lim_{x \rightarrow 3} f(x) = \lim_{x \rightarrow 3} (x + 1) = 3 + 1 = 4$$

$$\lim_{x \rightarrow 0} f(x) = \left. \begin{cases} \lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} (x^2 + 1) = 1 \\ \lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} (x + 1) = 1 \end{cases} \right\} = 1$$

6) a) = III

b) = I

c) = II

www.segundoperez.es

Pág. 282 Límites en el infinito.

Gráficamente, 1

Cálculo aproximado,

$$\lim_{x \rightarrow +\infty} \frac{3x-5}{x+100} = 3$$

$x$	$\frac{3x-5}{x+100}$
10	$\frac{3 \cdot 10 - 5}{10 + 100} = 0'2272$
100	$\frac{3 \cdot 100 - 5}{100 + 100} = 1'475$
1000	$\frac{3 \cdot 1000 - 5}{1000 + 100} = 2'7227$
10000	$\frac{3 \cdot 10000 - 5}{10000 + 100} = 2'9698$
1000000	2'999695
10000000	2'9999695

$$\lim_{x \rightarrow +\infty} 3x = +\infty$$

$$\lim_{x \rightarrow +\infty} (3x - 7) = +\infty$$

$$\lim_{x \rightarrow +\infty} (5 - 3x) = -\infty$$

$$\lim_{x \rightarrow +\infty} (x^2 - 3x) = +\infty$$

$$\lim_{x \rightarrow +\infty} (-5x^4 + 7x^3 - x^2 - 3x) = \lim_{x \rightarrow +\infty} (-5x^4) = -\infty$$

$$\lim_{x \rightarrow +\infty} \frac{3}{x} = 0$$

Pág 283, 1