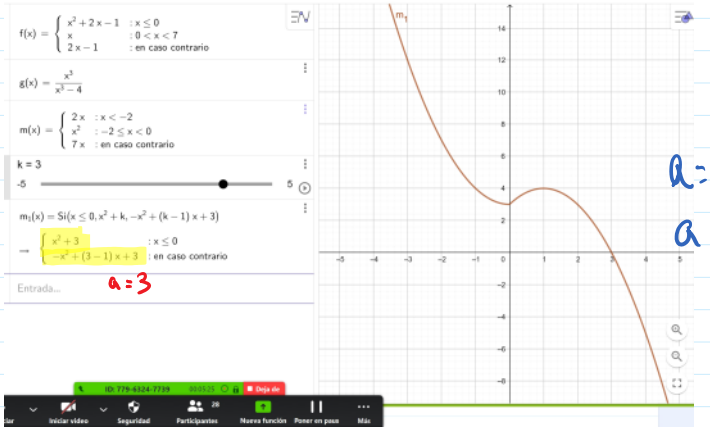
Limites de funciones

viernes, 17 de abril de 2020 12:16

6.- Halla el valor de ***a*** para que la siguiente función sea continua en $x = 0$

$$f(x) = \begin{cases} x^2 + a & x \le 0 \\ -x^2 + (a-1)x + 3 & x > 0 \end{cases}$$

Si $a = 8$ $\quad f_8(x) = \begin{cases} x^2+8 & x \le 0 \\ -x^2+7x+3 & x > 0 \end{cases}$



$a = 3$ f va a ser continua.

6.- Halla el valor de ***a*** para que la siguiente función sea continua en $x = 0$

$$f(x) = \begin{cases} x^2 + a & x \le 0 \\ -x^2 + (a-1)x + 3 & x > 0 \end{cases}$$

f sea continua $x = 0$

1) $f(0) = 0^2 + a = a$

2) $\lim_{x \to 0^+} f(x) = \lim_{\substack{x \to 0 \\ x > 0}} f(x) = \lim_{\substack{x \to 0 \\ x > 0}} \left(-x^2 + (a-1)x + 3\right) = 0 + 0 + 3$

$\lim_{x \to 0^-} f(x) = \lim_{\substack{x \to 0 \\ x < 0}} f(x) = \lim_{\substack{x \to 0 \\ x < 0}} (x^2 + a) = a$

3) f es continua $x = 0$ si y solo si

$f(0) = \lim_{x \to 0^+} f(x) = \lim_{x \to 0^-} f(x)$

$a = 3 = a$ → si y solo si ($\Leftrightarrow$)

Sol: f es continua si i en $x = 0$

$\boxed{a = 3}$

LIMITES EN EL INFINITO

$\lim_{x \to +\infty} f(x) = l_1$ $\qquad$ $\lim_{x \to -\infty} f(x) = l_2$

TABLA DE VALORES

x	$f(x)$
10^2	$f(10^2)$
10^3	$f(10^3)$
10^{100}	$f(10^{100})$
$\vdots$	$\vdots$
$(+\infty)$	¿ ?

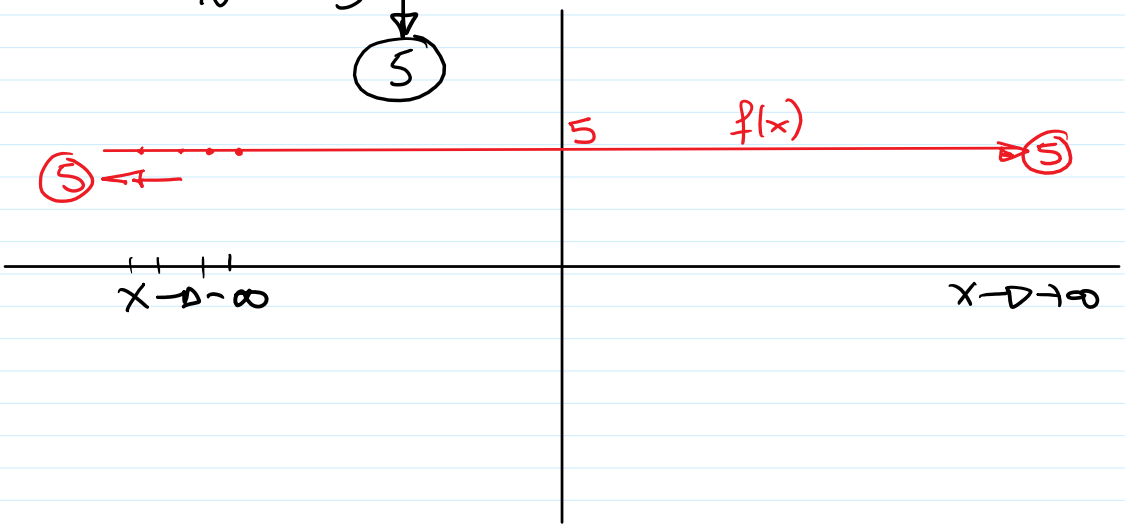
x	$f(x)$
-10^2	
-10^3	$\to$ $10^3)$
$\vdots$	$\vdots$
-10^{20}	??
$(-\infty)$	

$\lim_{x \to +\infty} 5 = 5$ $\qquad$ $\lim_{x \to -\infty} 5 = 5$

$f(x) = 5$

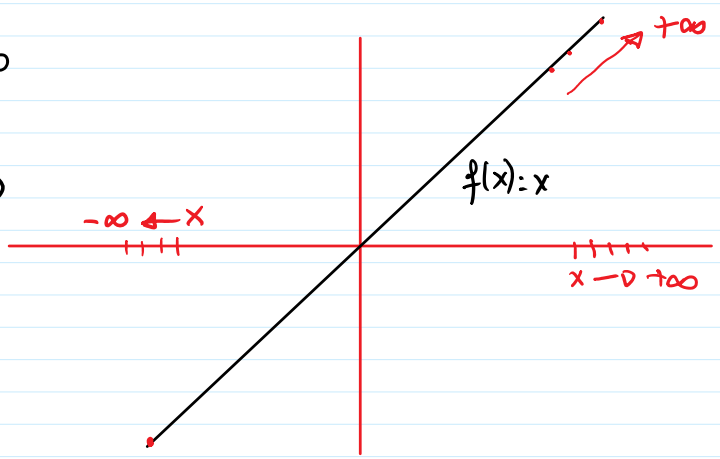
x	$f(x)$
10^2	$\to 5$
10^3	$\to 5$
10^{20}	$\to 5$

(5)



$\lim_{x \to +\infty} x = +\infty$

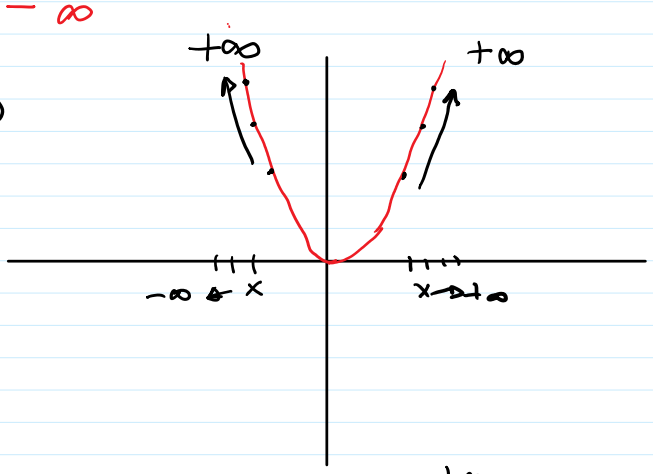
$\lim_{x \to -\infty} x = -\infty$



$-\infty$

$\lim_{x \to +\infty} x^2 = +\infty$

$\lim_{x \to -\infty} x^2 = +\infty$

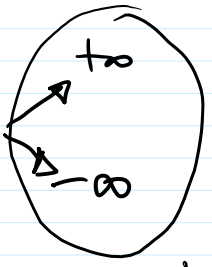


$\lim_{x \to +\infty} x^3 = +\infty$

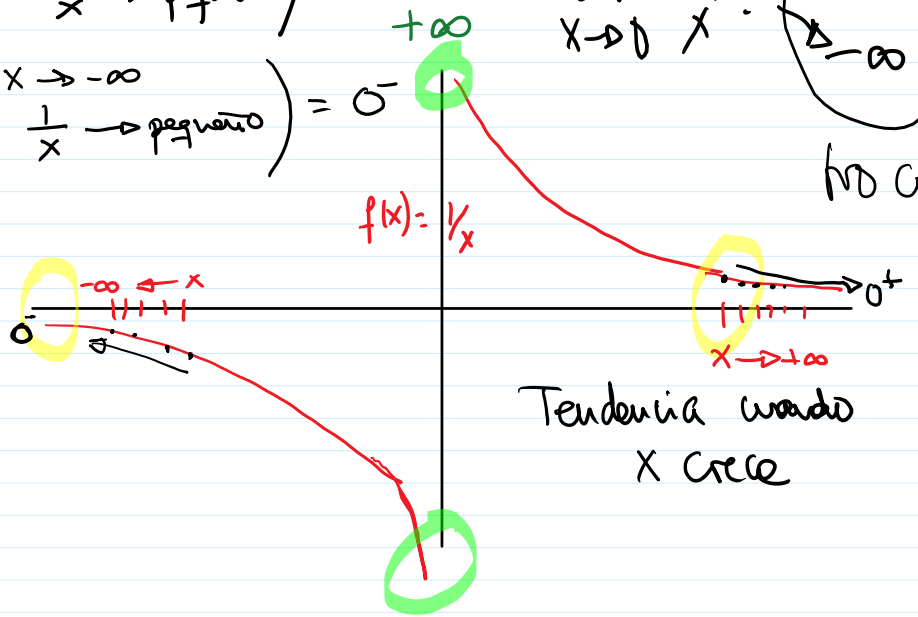
$\lim_{x \to -\infty} x^3 = -\infty$

$\lim_{x \to +\infty} \frac{1}{x} = \left(\begin{array}{l} x \to +\infty \\ \frac{1}{x} \to \text{pequeño} \end{array} \right) = 0^+$

$\lim_{x \to -\infty} \frac{1}{x} = \left(\begin{array}{l} x \to -\infty \\ \frac{1}{x} \to \text{pequeño} \end{array} \right) = 0^-$

$\lim_{x \to 0} \frac{1}{x} =$ 

No continua



Tendencia cuando x crece

$\lim_{x \to \infty} \left(x^7 - \right.$ $= \lim_{x \to \infty} x^7 = \begin{cases} x \to +\infty \to +\infty \\ x \to -\infty \to -\infty \end{cases}$

$\lim_{x \to +\infty} \left(\frac{x^7 - 8x^5 + 3x}{x^8 + 3x^2 - 1000} \right) = \lim_{x \to +\infty} \frac{x^7}{x^8} = \lim_{x \to +\infty} \frac{1}{x} = 0$

no simplificar

simplificar

Si $x < 0$ NEG

$\lim_{x\to+\infty} \left| x^8+3x^6-1000 \right|$ no simplificar $\quad x\to+\infty \ x^8$ simplificar $\quad x\to+\infty$

Si $x<0$ NEG

$-3x>0$ POS

$$\lim_{x\to-\infty} \left(\frac{-3x^3+7x^2+8}{5x^2+7x-1}\right) = \lim_{x\to-\infty} \left(\frac{-3x^3}{5x^2}\right) = \lim_{x\to-\infty} \frac{-3x}{5} = +\infty$$

SIMPLIFICAR