Límites funciones avanzadas

martes, 21 de abril de 2020 10:18

2.- Combina la operación radical con el operador *límite*:

a) $\lim_{x\to\infty}\left(\dfrac{1}{\sqrt{x^2-x}}\right)$

b) $\lim_{x\to 0}\left(\dfrac{1}{\sqrt{x^2-x}}\right)$

(b) $\lim_{x\to 0^+}\dfrac{1}{\sqrt{x^2-x}} = \dfrac{1}{\lim_{x\to 0^+}\sqrt{x^2-x}} = \dfrac{1}{+\sqrt{\lim_{x\to 0}(x^2-x)}} =$

$= \left(\dfrac{1}{\sqrt{0^2-0}}\right) = \left(\dfrac{1}{0^+}\right) = +\infty$

¿Será por la derecha o por la izqda?

Estudiamos el $D(f)$ $\quad f(x) = \dfrac{1}{\sqrt{x^2-x}}$ $\qquad x^2-x=0 \quad x(x-1)=0$

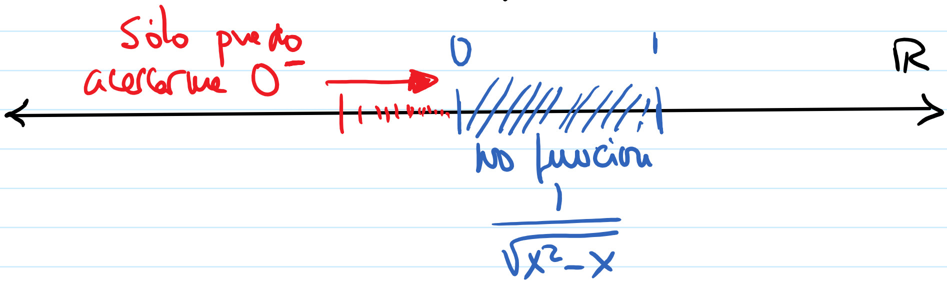
$x=0 \quad x=1$

x^2-x ES NEGATIVO EN $(0,1)$

x^2-x ES POSITIVO EN $(-\infty,0)\cup(1,+\infty)$

POR TANTO SOLO PODEMOS "ACERCARNOS" a $x=0$

si $x\in(-\infty,0) \Rightarrow \lim_{x\to 0}\dfrac{1}{\sqrt{x^2-x}} = \lim_{x\to 0^-}\dfrac{1}{\sqrt{x^2-x}} = \infty$



PREGUNTA: Si hay que calcular $\lim_{x\to 1}\dfrac{1}{\sqrt{x^2-x}}$

¿Será por la IZDA. ó por la DRCHA.?

$\frac{k}{0} = \infty$ $\qquad$ $\frac{k}{\infty} = 0$ (Forma de hablar)

$$\lim_{x \to 0} \left(\frac{7}{x}\right) =$$

$x \to 0$	$0'1$	$0'01$	$0'001$	$\to 0$
$f(x)$	$\frac{1}{0'1} = 10$	$f(0'01) = \frac{1}{0'01} = 100$	$f(0'001) = 1000$	$\to \infty$

$$\boxed{\lim_{x \to 0} \frac{7}{x} = \infty}$$

Proceso mental

$\frac{k}{\infty} = 0$

x	10	100	10^7	...	10^{20}	$\to \infty$
$f(x)$	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{10^7}$		$\frac{1}{10^{20}}$	....
	$0'1$	$0'01$	10^{-7}		10^{-20}	$\to 0$

$$\boxed{\lim_{x \to \infty} \frac{7}{x} = 0}$$

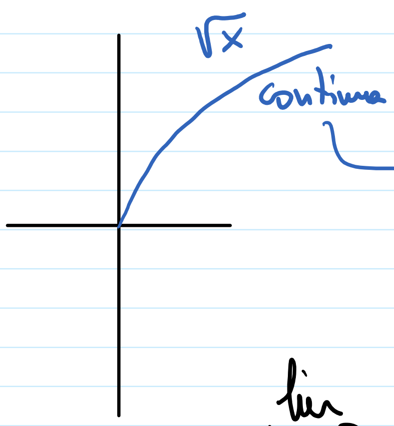
$$\lim_{x \to \infty} \frac{1}{\sqrt{x^2 - x}} = \frac{1}{\lim_{x \to \infty} \sqrt{x^2 - x}} = \frac{1}{\sqrt{\lim_{x \to \infty} (x^2 - x)}} =$$

$$= \frac{1}{\sqrt{\lim_{x \to \infty} x^2}} = \left(\frac{1}{\sqrt{\infty}}\right) = \left(\frac{1}{\infty}\right) = 0$$

$$\lim_{x \to 7} \sqrt{p(x)} = \sqrt{\lim_{x \to 7} p(x)}$$

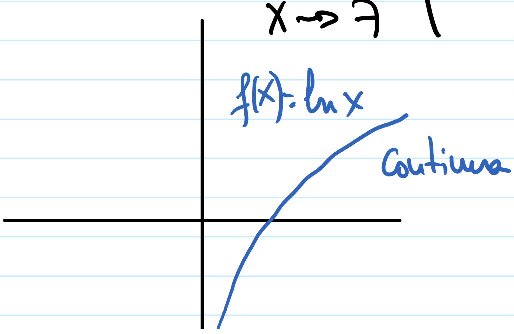
Conmuta lim con $\sqrt{\ }$

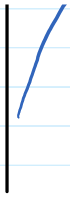
$\lim(\sqrt{\ }) = \sqrt{\lim}$



$$\lim_{x \to 7} \left(\ln(x^2 + 8)\right) = \ln\left(\lim_{x \to 7} (x^2 + 8)\right) =$$

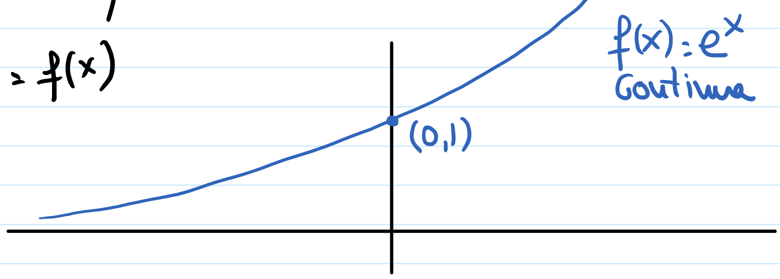
$$= \ln(7^2 + 8) = \ln 57 = \boxed{4'04}$$





$$\lim_{x\to 2}\left(e^{x-2}\right) = e^{\lim_{x\to 2}(x-2)} = e^{2-2} = e^{0} = \boxed{1}$$

$e^x = f(x)$



$$\lim_{x\to+\infty}\left(e^{\left(\frac{x^3+7x}{2x^3-8}\right)}\right) = e^{\lim_{x\to+\infty}\left(\frac{x^3+7x}{2x^3-8}\right)} = e^{1/2} = \sqrt{e} = \boxed{1'648}$$

$$\frac{1}{2} = \lim_{x\to+\infty}\frac{1\cdot x^3+7x}{2x^3-8} = \frac{\lim_{x\to+\infty} x^3+7x}{\lim_{x\to+\infty} 2x^3-8} =$$

$$= \frac{\lim_{x\to+\infty} x^3}{\lim_{x\to+\infty} 2x^3} = \left(\frac{\infty}{\infty}\right) = \lim_{x\to+\infty}\frac{\cancel{x^3}}{2\cancel{x^3}} = \lim_{x\to+\infty}\left(\frac{1}{2}\right) = \boxed{\frac{1}{2}}$$

INDETERMINACIÓN

$$\lim_{x\to\infty} 3^{\frac{x^2+7}{x^2+3}} = 3^{\lim_{x\to\infty}\frac{x^2+7}{x^2+3}} = 3^{\frac{1}{1}} = \boxed{3}$$