Selectividad

(5) $\lim_{x\to+\infty} |2x-\sqrt{4x^2+ax+1}|=1$

$\lim_{x\to+\infty} (2x-\sqrt{4x^2+ax+1}) = \infty-\infty$

$\lim_{x\to+\infty} \frac{4x^2-(4x^2+ax+1)}{2x+\sqrt{4x^2+ax+1}} = \frac{\infty}{\infty} \quad \frac{-a}{2+\sqrt{4}} = -\frac{a}{4}$

$-\frac{a}{4}=1 \quad a=-4$

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(6) $\lim_{x\to 1} \frac{x^3-2x^2+x}{1-3x+3x^2-x^3}$

$\lim_{x\to 1^+} f(x) = \frac{0}{0} \quad \lim_{x\to 1} \frac{x(x-1)^2}{(x-1)^3} = \frac{1}{0^-} = -\infty$

$\lim_{x\to 1^-} f(x) = \frac{0}{0} \quad \lim_{x\to 1} \frac{x}{-(x-1)} = \frac{1}{0^+} = +\infty$

$\nexists \lim_{x\to 1} f(x)$

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

$e^{\lim_{x\to\infty} \frac{x^2+3}{x}\left(\frac{x^2+x+1}{x^2+1}-1\right)}$

$e^{\lim_{x\to\infty} \frac{x^2+3}{x}\cdot\frac{x}{x^2+1}} = e^{\frac{\infty}{\infty}} = e^{1/1} = e$

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(8) $\lim_{x\to 0} \frac{\sqrt{1+x}-\sqrt{1-x}}{3x} = \frac{0}{0}$

$\lim_{x\to 0} \frac{1+x-1+x}{3x(\sqrt{1+x}+\sqrt{1-x})} = \frac{0}{0}$

$\lim_{x\to 0} \frac{2x}{3x(\sqrt{1+x}+\sqrt{1-x})} = \frac{2}{3(\sqrt{1}+\sqrt{1})} = \frac{2}{6} = \frac{1}{3}$

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ASINT Y RAMAS INF

① $y = \frac{x^2-5x+7}{x-2}$

A.V $x=2$ $\lim_{x\to 2^-} f(x) = \frac{1}{0^-} = -\infty$ $\lim_{x\to 2^+} f(x) = \frac{1}{0^+} = +\infty$

A.H $\lim_{x\to\infty} f(x) = \frac{\infty}{\infty} = \infty$ ✗

A.O $y = mx+n$

$m = \lim_{x\to\infty} \frac{f(x)}{x} = \lim_{x\to\infty} \frac{x^2-5x+7}{x^2-2x} = \frac{\infty}{\infty} = 1$

$n = \lim_{x\to\infty} [f(x)-mx] = \lim_{x\to\infty} \left[\frac{x^2-5x+7}{x-2} - 1x\right]$

$\lim_{x\to\infty} \frac{-3x+7}{x-2} = -3$ $\boxed{y = x-3}$

| x | 0 | 3 |
|---|---|---|
| y | -3 | 0 |

$f(100) > Asint(100)$

$f(-100) < Asint(-100)$

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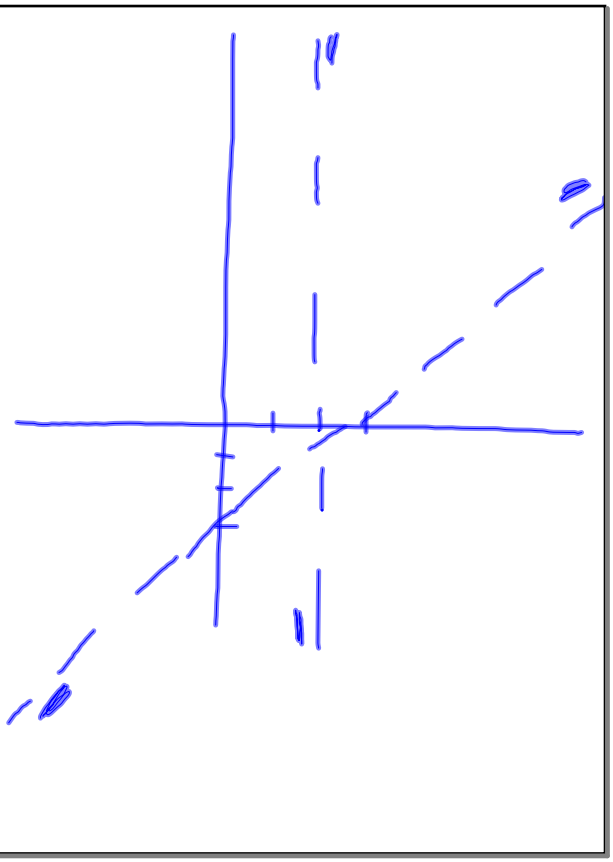

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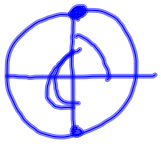
$y = \sec(2x+\pi) = \frac{1}{\cos(2x+\pi)}$

A.V $\cos(2x+\pi) = 0$



$2x+\pi = \frac{\pi}{2} + k\pi$

$4x+2\pi = \pi + 2k\pi$

$x = \frac{2k\pi-\pi}{4}$

A.V $\boxed{x = \frac{k\pi-\pi}{4}}$

$2x+180^\circ = 90^\circ + 180^\circ k$

$2x = -90 + 180^\circ k$

$\boxed{x = -45^\circ + 90^\circ k}\ \forall k \in \mathbb{Z}$

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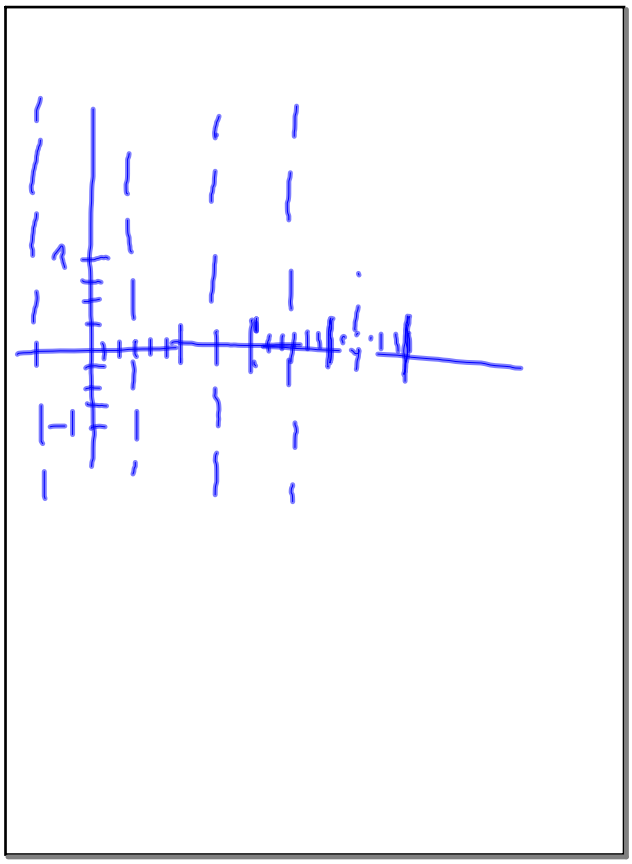

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$y = \frac{x^2-1}{2x+2} = \frac{(x-1)(x+1)}{2(x+1)} = \frac{1}{2}x - \frac{1}{2}$

A.V $x = -1$

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

$-1^+$

A.H $\lim_{x \to \infty} f(x) = \frac{\infty}{\infty} = \infty$ ✗

A.O $m = \lim_{x \to \infty} \frac{x^2-1}{2x^2+2} = \frac{\infty}{\infty} = 1/2$

$n = \lim \frac{x^2-1}{2x+2} - \frac{x}{2} = \lim \frac{x^2-1-x^2-x}{2(x+1)}$

$1. \; t \to \infty$ $\quad -1/2$

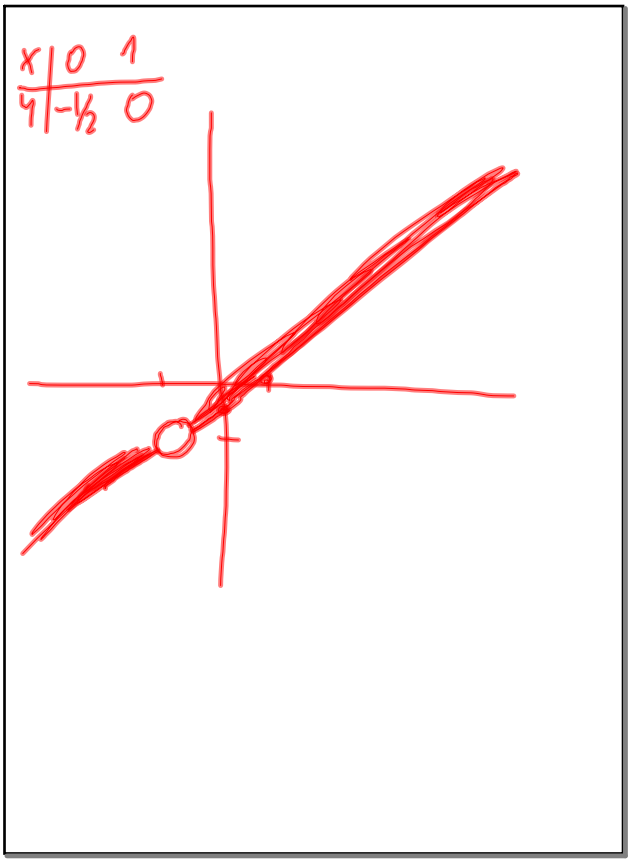
$y = \frac{1}{2}x - \frac{1}{2}$

$f(100) = Asint(100)$

$f(-100) \neq Asint(-100)$

dic 17-14:26

| x | 0 | 1 |
|---|---|---|
| y | -½ | 0 |



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CONTINUIDAD DE UNA FUNCION EN UN PTO

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

Discontinua.

I. S. Inf

Alm Lnk Lateral se va al inf



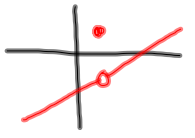
F. S. Finito

Los 2 Lmts Laterales son finitos, pero distintos,



Evitable

Los 2 Lmts Laterales son iguales y finitos pero $\neq f(a)$ ó $\nexists f(a)$



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Func. sin trozos

(1) Dominio
(2) Continua en su dominio

$f(x)=2x^3+x$ $D=\mathbb{R} \Rightarrow f$ cont en $\mathbb{R}$

$f(x)=\frac{2x+1}{x}$ $D=\mathbb{R}-\{0\} \Rightarrow f$ cont en $\mathbb{R}-\{0\}$

En $x=0$ $\lim_{x\to 0}\frac{2x+1}{x}=\frac{1}{0}$ $\begin{cases}\lim_{x\to 0^-} f(x)=\frac{1}{0^-}=-\infty \\ \lim_{x\to 0^+} f(x)=\frac{1}{0^+}=+\infty\end{cases}$ D.I.S.I.F.

$f(0)=\frac{1}{0}$ $\nexists$

$f(x)=\sqrt[3]{x+1}$ $D=\mathbb{R} \Rightarrow f$ cont en $\mathbb{R}$

$f(x)=\sqrt[4]{x+1}$ $x+1\geq 0$ $x\geq -1$ $D=[-1,\infty) \Rightarrow f$ cont en $[-1,\infty)$

$f(x)=2^x$ $D=\mathbb{R} \Rightarrow f$ cont en $\mathbb{R}$

$f(x)=\log(2-x)$ $2-x>0$ $-x>-2$ $x<\frac{-2}{-1}$ $x<2$

$D=(-\infty,2) \Rightarrow f$ cont en $(-\infty,2)$

$f(x)=\operatorname{ctg} x=\frac{\cos x}{\operatorname{sen} x}$ $\operatorname{sen} x=0$  $x=0^\circ+180^\circ k$

$D=\mathbb{R}-\{0^\circ+180^\circ k\}$ $f$ cont en $\mathbb{R}-\{0^\circ+180^\circ k\}$

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f Func con trozos

$$f(x)=\begin{cases} f_1(x) & x<a \\ f_2(x) & a\leq x\end{cases}$$

Est la cont. de cada $f_i$ en su trozo $\Rightarrow$ PTO malos

En los ptos que esta def a trozos $x=a$

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

$f(a)$ $\nexists$

dic 17-14:41

$$f(x)=\begin{cases} 2x & -2<x<0 \\ \frac{2x}{x-1} & 0<x\leq 2 \\ x+2 & 2<x<3 \\ \frac{7}{x+1} & 3<x \quad (3,+\infty)\end{cases}$$

$f_1(x)=2x \Rightarrow f_1$ es cont en $\mathbb{R} \Rightarrow f$ cont $(-2,0)$

$f_2(x)=\frac{2x}{x-1} \Rightarrow f_2$ cont en $\mathbb{R}-\{1\} \Rightarrow f$ cont $(0,2)-\{1\}$

$f_3(x)=x+2$ $f_3$ cont en $\mathbb{R} \Rightarrow f$ cont $(2,3)$

$f_4(x)=\frac{7}{x+1}$ $f_4$ cont en $\mathbb{R}-\{-1\} \Rightarrow f$ cont $(3,\infty)$

$f$ cont en $(-2,\infty)-\{1,0,2,3\}$

En $x=1$ $\lim_{x\to 1}\frac{2x}{x-1}=\frac{2}{0}$ $\begin{cases}\lim_{x\to 1^-} f(x)=\frac{2}{0^-}=-\infty \\ \lim_{x\to 1^+} f(x)=\frac{2}{0^+}=+\infty\end{cases}$

$f(1)=\frac{2}{0}$ $\nexists$

D. Inev de salto infinito

dic 17-14:42

En $x=0$

$\lim_{x\to 0} f(x)$ $\begin{cases}\lim_{x\to 0^-} 2x=0 \\ \lim_{x\to 0^+}\frac{2x}{x-1}=0\end{cases}$ Discontinua evitable. Se evita def $f(0)=0$

$f(0)=\nexists$

En $x=2$

$\lim_{x\to 2} f(x)$ $\begin{cases}\lim_{x\to 2}\frac{2x}{x-1}=4 \\ \lim_{x\to 2^+} x+2=4\end{cases}$ Cont en $x=2$

$f(2)=\frac{4}{1}=4$

En $x=3$

$\lim_{x\to 3} f(x)$ $\begin{cases}\lim_{x\to 3^-} x+2=5 \\ \lim_{x\to 3^+}\frac{7}{x+1}=7/4\end{cases}$ D. Inev de salto fin

Salto $\left|5-\frac{7}{4}\right|=$

$f(3)$ $\nexists$

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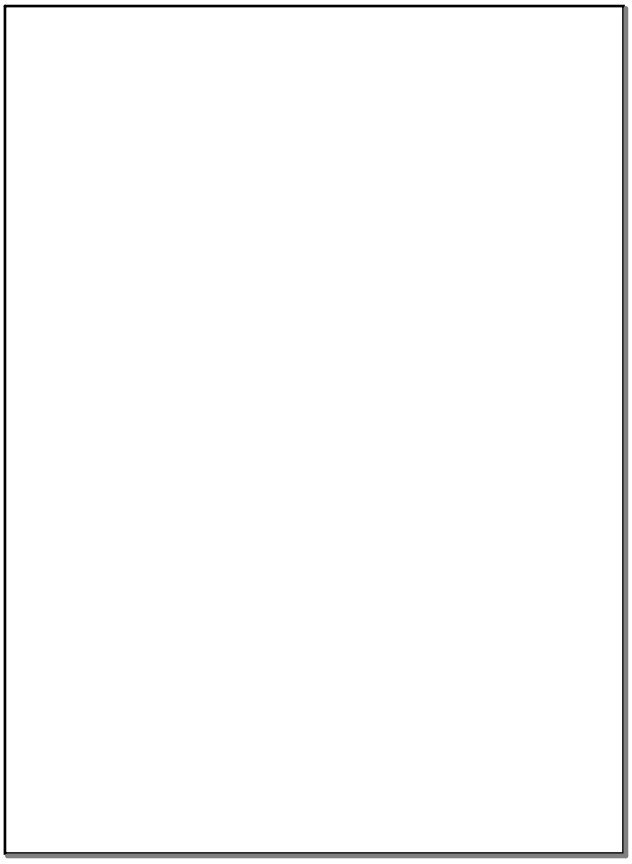

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