(16)

2) $\lim_{x\to -1} \frac{x^8+1}{x^2-3x-4} = \frac{0}{0}$

$\overset{l'H}{\approx} \lim_{x\to -1} \frac{3x^2}{2x-3} = \frac{3}{-5}$

k) $\lim_{x\to 0} \frac{\sin x}{1-\cos x} = \frac{0}{0}$

MODO 1 $\approx \lim_{x\to 0} \frac{x}{x^2/2} = \lim_{x\to 0} \frac{2x}{x^2} = \frac{2}{0}$

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

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

MODO 2 $\overset{l'H}{\approx} \lim_{x\to 0} \frac{\cos x}{\sin x} = \frac{1}{0}$

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e) $\lim_{x\to 0} \frac{\arctg x - x}{x - \sin x} = \frac{0}{0}$

$\overset{l'H}{\approx} \lim_{x\to 0} \frac{\frac{1}{1+x^2} - 1}{1-\cos x} =$

$\approx \lim_{x\to 0} \frac{\frac{-x^2}{1+x^2}}{x^2/2} =$

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

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g) $\lim_{x\to 0} \frac{\ln(\cos 3x)}{x^2} = \frac{0}{0}$

$\overset{l'H}{\approx} \lim_{x\to 0} \frac{\frac{1}{\cos 3x}(-\sin 3x)\cdot 3}{2x}$

$\lim_{x\to 0} \frac{-3\sin 3x}{\cos 3x \cdot 2x} \approx 3x$

$\lim_{x\to 0} \frac{-9x}{2x\cos 3x} = \frac{-9}{2}$

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i) $\lim_{x\to 0} \frac{1-\cos^2(2x)}{3x^2} = \frac{0}{0}$

$\overset{l'H}{\approx} \lim_{x\to 0} \frac{+2\cos 2x \sin 2x \cdot 2}{6x} \approx$

$\lim_{x\to 0} \frac{4\cos 2x \cdot 2x}{6x} = \frac{8}{6} = \frac{4}{3}$

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h) $\lim_{x\to 0} \frac{1-\cos x}{e^x-1} = \frac{0}{0}$

$\overset{\text{l'H}}{=} \lim_{x\to 0} \frac{+\sin x}{e^x} = \frac{0}{1} = 0$

$\lim_{x\to 0} \frac{e^x-1}{x} \overset{\text{l'H}}{=} \lim_{x\to 0} \frac{e^x}{1} = 1$

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23) $y = \frac{1}{x}$ $(3, \frac{1}{3})$

$y - f(3) = f'(3)(x-3)$

$f(3) = \frac{1}{3}$

$f'(x) = -\frac{1}{x^2}$ $f'(3) = -\frac{1}{9}$

$y - \frac{1}{3} = -\frac{1}{9}(x-3)$

$y = -\frac{1}{9}x + \frac{2}{3}$ $x=0$ $y = \frac{2}{3}$; $y=0$ $x=6$

$(0, \frac{2}{3})$ $\left(\frac{0+6}{2}, \frac{\frac{2}{3}+0}{2}\right) = (3, \frac{1}{3})$ $(6,0)$

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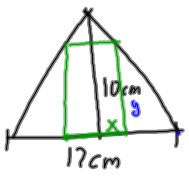
38)



$A = xy$



$\frac{10}{6} = \frac{y}{6-x/2} \Rightarrow y = \frac{60-5x}{6}$

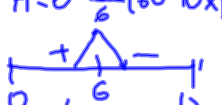
$A = \frac{60x-5x^2}{6} \geq 0$ $0 \leq x \leq 12$

$60x - 5x^2 \geq 0$ $D = (0,12)$

$5x(12-x) = 0$

b) A max

$A' = 0$ $\frac{1}{6}(60-10x) = 0$ $x = 6$



$y = 5$



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58) $f(x) = \begin{cases} 5x+1 & x<1 \\ ax^2+bx+3 & x \geq 1 \end{cases}$

Te Rolle en $[0,c]$

1) f cont $[0,c]$

f cont en $\mathbb{R} - \{1\}$

En $x=1$

$\lim_{x\to 1} f(x)$ $\begin{cases} \lim_{x\to 1^-} 5x+1 = 6 \\ \lim_{x\to 1^+} ax^2+bx+3 = a+b+3 \end{cases}$

$f(1) = a+b+3$

$a+b+3 = 6$ $a+b=3$

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[2] f der. en $(0,c)$

$$f'(x)=\begin{cases}5 & x<1\\ 2ax+b & x>1\end{cases}$$

f der. en $\mathbb{R}-\{1\}$

En $x=1$ $f'(1^-)=5$

$f'(1^+)=2a+b$

$2a+b=5$

[3] $f(0)=f(c)$

$f(0)=1$

$f(c)\begin{cases}5c+1\\ ac^2+bc+3\end{cases}$

$1=5c+1$ $\cancel{c=0}$

$ac^2+bc+3=1$

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$$\begin{cases}a+b=3\\ 2a+b=5\\ ac^2+bc=-2\end{cases}$$

$a=2$ $b=1$

$2c^2+c+2=0$

$$c=\frac{-1\pm\sqrt{1-16}}{4}\ \nexists$$

NO HAY SOL.

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REP. POLINOMIOS

$f(x)=x^3-6x^2+9x+5$

$D=\mathbb{R}$

P.C $x=0$ $y=5$

$y=0$ | 1 -6 9 5 ?? $(-1,0)$

Ramas inf $\lim_{x\to+\infty} f(x)=+\infty$, $\lim_{x\to-\infty} f(x)=-\infty$

Monot y ext $f'(x)=3x^2-12x+9$

$D(f\cap f')=\mathbb{R}$

$f'(x)=0$ $x^2-4x+3=0$ $x=\frac{4\pm2}{2}$ 3, 1

+ − +

1 3

$f'(0)$ $f'(2)$ $f'(4)$

Crec $(-\infty,1)\cup(3,\infty)$

Dec $(1,3)$

MAX $(1,f(1))=(1,9)$

MIN $(3,f(3))=(3,5)$

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Curv y PI $y''=6x-12$

$D(f\cap f'\cap f'')=\mathbb{R}$

$f''(x)=0$ $x=2$

− +

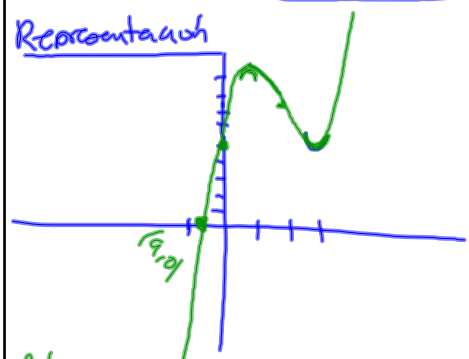
$f''(0)$ 2 $f''(3)$

Cóncava $(-\infty,2)$

Convexa $(2,\infty)$

PI $(2,f(2))=(2,7)$

Representación



$f(-1)=-1-6-9+5<0$

$f(0)=5>0$ $(0,\ldots,0)$

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