(21) $f(x)=x^3+ax^2+bx+c$ $\quad y'=3x^2+2ax+b$

$y''=6x+2a$

$f(1)=1 \quad 1+a+b+c=1 \quad c=0$

$f'(1)=0 \quad 3+2a+b=0 \quad b=3$

NO TIENE EXT REL en $x=1$

$f'(1)=0$ — $f''(1)>0$ m; $f''(1)=0$; $f''(1)<0$ M

$6+2a=0 \quad a=-3$

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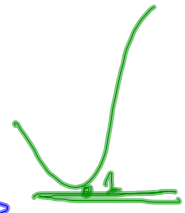
(22) $f(x)=x^3+ax^2+bx+5$

$x=1$ PI $f''(1)=0$

T.H $f'(1)=0$



$f'(x)=3x^2+2ax+b$

$0=m=f'(1)$

$f''(x)=6x+2a$

$f''(1)=0 \quad 6+2a=0 \quad a=-3$

$f'(1)=0 \quad 3+2a+b=0 \quad b=3$

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(27) $y=|\underbrace{x^2-4}_{=0}|$

$+ \quad -2 \quad - \quad 2 \quad +$

$$f(x)=\begin{cases} x^2-4 & x\le -2 \\ -x^2+4 & -2<x\le 2 \\ x^2-4 & x>2 \end{cases} \qquad v_x=0$$

$$f'(x)=\begin{cases} 2x & x<-2 \\ -2x & -2<x<2 \\ 2x & x>2 \end{cases}$$

$$f'(x)=0 \begin{cases} 2x=0 & \cancel{x=0<-2} \\ -2x=0 & x=0\in(-2,2) \\ 2x=0 & \cancel{x=0>2} \end{cases}$$

$- \quad -2 \quad + \quad 0 \quad - \quad 2 \quad +$

Max rel $(0,f(0))=(0,4)$

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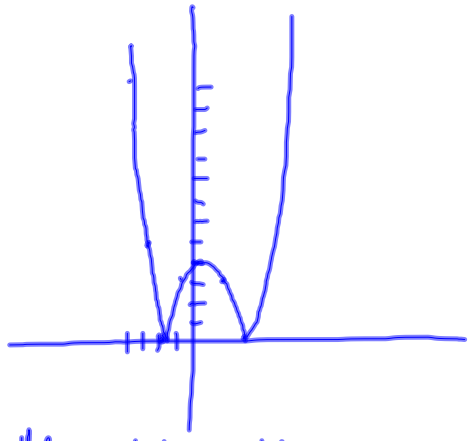
x	$-\infty$	-4	-3	-2	-2	-1	0	1	2	2	3	4	$+\infty$
y	$+\infty$	12	5	0	0	3	4	3	0	0	5	12	$+\infty$



Max rel $(0,4)$ | Min rel $\cup$ $\nexists$

$\nexists$ Max abs | Min Abs $(-2,0)$ y $(2,0)$

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EXT. ABS Y REL.

$y = x^2 + 4x + 3$

a) Ext Abs y rel

b) Ext Abs y rel $[-4, 2)$

c) " " $[-4, 2]$

d) Ext / " " $(-4, 2]$

e) " " " $(-4, -2)$

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$V_x = \frac{-4}{2} = -2$

x	-4	-3	-2	-1	0
y					

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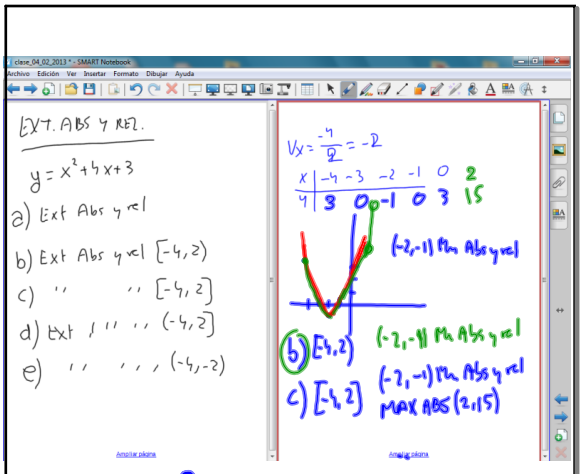

d) igual que c)

e) igual que b)

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$y = \frac{2}{(x-1)^2}$ en $[0, 3)$

Ext Abs y rel

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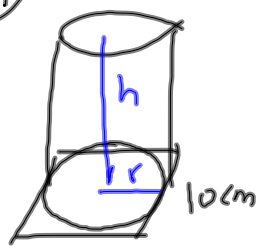

Alcilindro = $50cm^2$

$50 = 2\pi r h$

$h = \frac{25}{\pi r}$

$V_{max} = \pi r^2 h$

$V = \pi r^2 \frac{25}{\pi r} = 25r$

$V = 25 \neq 0$

$r = 5cm \quad h = 5/\pi\ cm$

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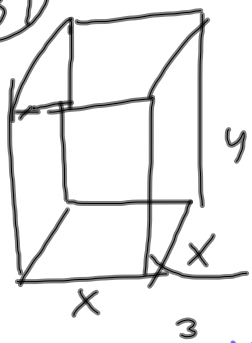

50% más caro

$V = 80cm^3 = x^2 y$

$Costo = x^2 + 4xy + x^2(1.5)$

$x^2 + \frac{50}{100}x^2$

Sigue. — —

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TEOREMAS DE DERIVABILIDAD

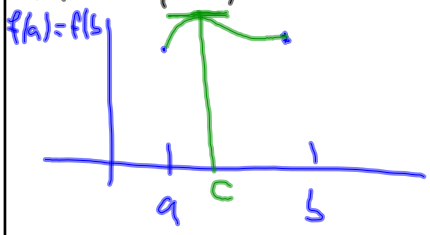
TEOREMA DE ROLLE

f cont en $[a,b]$

f derivable en (a,b)

$f(a) = f(b)$

$\Rightarrow \exists c \in (a,b) \Rightarrow f'(c) = 0$



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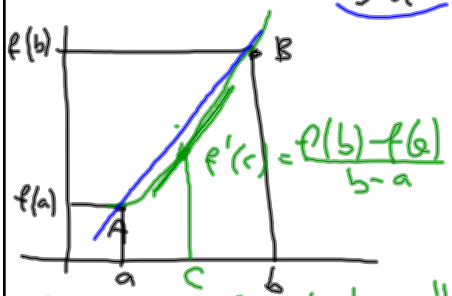
TEOREMA DEL VALOR MEDIO

f cont en $[a,b]$

f derivable en (a,b)

$\xRightarrow{T.V.M}$

$\exists c \in (a,b) \Rightarrow \frac{f(b)-f(a)}{b-a} = f'(c)$



$\exists c \in (a,b)$ / la recta tg en "x=c" es paralela a la recta que pasa por A y B

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REGLA DE L'HOPITAL $\left(\frac{0}{0}, \frac{\infty}{\infty}\right)$

$$\lim_{x\to a} \frac{f(x)}{g(x)} \overset{\text{l'H}}{=} \lim_{x\to a} \frac{f'(x)}{g'(x)}$$

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

$$\overset{\text{l'H}}{=} \lim_{x\to\infty} \frac{3x^2+2}{1} = \infty$$

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

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

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

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

$$\lim_{x\to 0} \sin x = \lim_{x\to 0} x$$

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$$\lim_{x\to 0} \frac{2\sin x + 3x}{4x} = \frac{0+0}{0} = \frac{0}{0}$$

$$\overset{\text{l'H}}{=} \lim_{x\to 0} \frac{2\cos x + 3}{4} =$$

$$\frac{2\cos 0 + 3}{4} = \frac{5}{4}$$

$$\lim_{x\to 1} \frac{2x^3 - 2x}{4x^5 + 3x^4 - 7x^3 + x^2 - 1} = \frac{0}{0}$$

$$\overset{\text{l'H}}{=} \lim_{x\to 1} \frac{6x^2 - 2}{20x^4 + 12x^3 - 21x^2 + 2x} =$$

$$= \frac{6-2}{20+12-21+2} = \frac{4}{13}$$

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$$\left(\frac{x+1}{e^x}\right)' = \frac{(x+1)'}{(e^x)'}$$

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