COLEGIO ALMA'S
bilingual school

APELLIDOS Y NOMBRE: Corrección Examen de Evaluación

CURSO: 1º Bachillerato Nº 2ª Evaluación

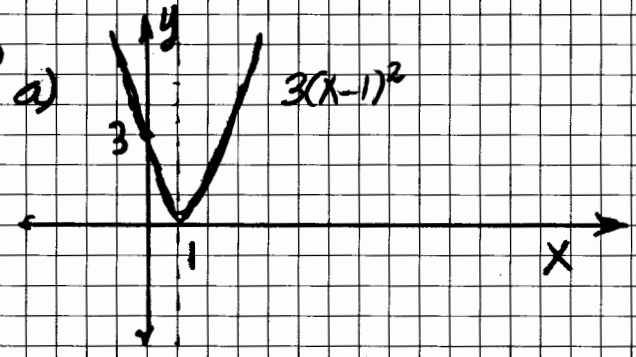
FECHA: 02-03-2018 ASIGNATURA: Matemáticas I

1.- a) $\frac{3i^2+i^5}{i^4-3i^2} = \frac{-3+i^5}{-1-3i^2} = \frac{3-i}{1+3} \cdot \frac{1-3i}{1-3i} = \frac{3-9i-i+3}{1+9} = \frac{-10i}{10} = \boxed{-i}$

b) $(\sqrt{2}-\sqrt{2}i)^4 = \left(2_{\frac{7\pi}{4}}\right)^4 = 16_{7\pi} = 16_{\pi} = \boxed{-16}$

c) $\sqrt[3]{4\sqrt{3}+4i} = \sqrt[3]{8}_{\frac{\pi}{6}} \rightarrow \boxed{2_{\frac{\pi}{18}}, 2_{\frac{13\pi}{18}}, 2_{\frac{25\pi}{18}}}$

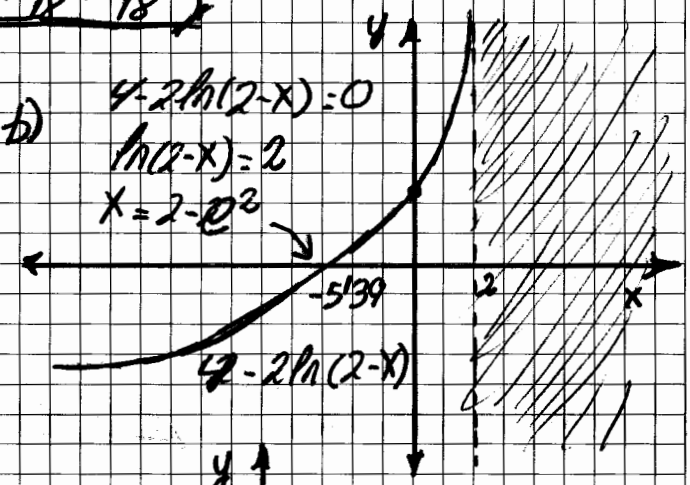
2.- a) $3(x-1)^2$



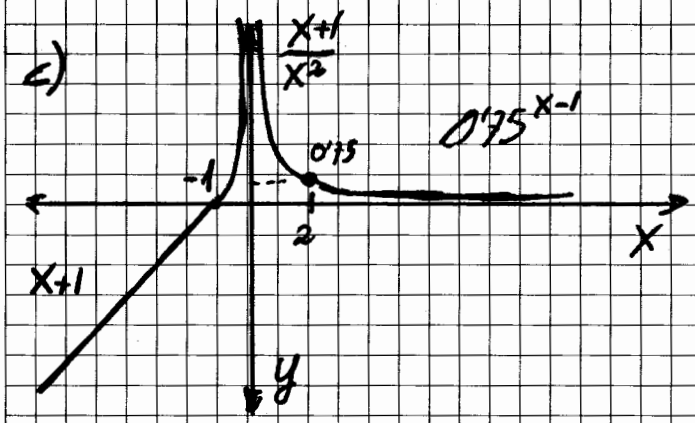
b) $y-2\ln(2-x)=0$

$\ln(2-x)=2$

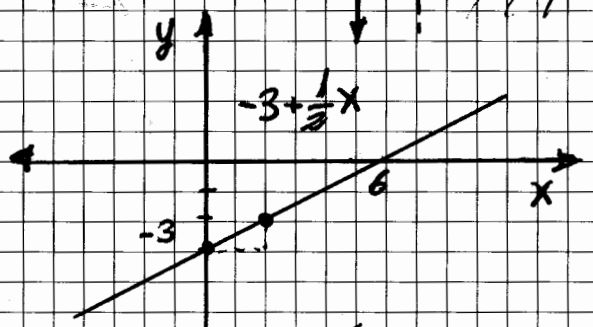
$x=2-e^2$



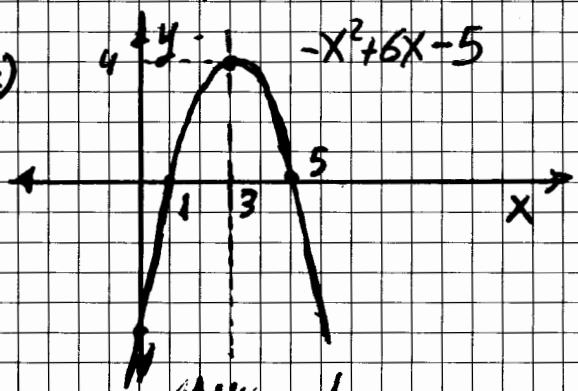
c) $\frac{x+1}{x^2}$ $0'75^{x-1}$



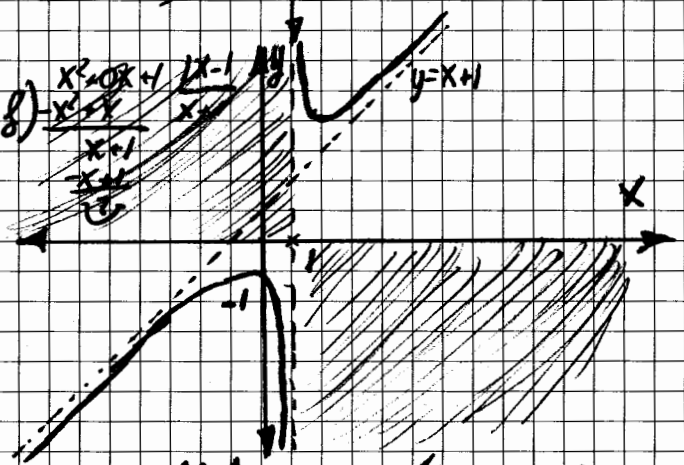
d)



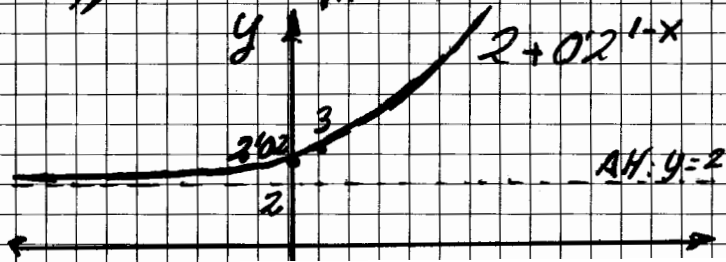
e) $-x^2+6x-5$



f)



g) $x^2(x-2)$



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CURSO:..... Nº.....

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3- a) $y' = \dfrac{2x(x+1)\cos(x^2+1) - \operatorname{sen}(x^2+1)}{(x+1)^2}$

b) $y' = 2x \operatorname{arctg}(2x-x^2) + x^2 \dfrac{2-2x}{1+(2x-x^2)^2}$

c) $y' = \dfrac{1-2x}{4\sqrt[4]{(2x-x^2)^3}}$

d) $\ln y = \dfrac{1}{x}\ln(x+1) \longrightarrow \dfrac{y'}{y} = \dfrac{-1}{x^2}\ln(x+1) + \dfrac{1}{x(x+1)}$

$y' = \left[\dfrac{-\ln(x+1)}{x^2} + \dfrac{1}{x(x+1)}\right]\sqrt[x]{x+1}$

e) $y' = (1-2\operatorname{sen}x)\, e^{x+2\cos x}$

f) $y' = \dfrac{3x^2}{1+(x^3+1)^2}$

g) $y = \ln x - \dfrac{1}{2}\ln(x+1) \longrightarrow y' = \dfrac{1}{x} - \dfrac{1}{2(x+1)}$

4- a) $\lim_{x\to-\infty} \dfrac{3x^2-2}{3-x^2+3x} \overset{\infty/\infty}{\underset{L'H}{=}} \lim_{x\to-\infty} \dfrac{6x}{-2x+3} \overset{\infty/\infty}{\underset{L'H}{=}} \lim_{x\to-\infty} \dfrac{6}{-2} = \boxed{-3}$

b) $\lim_{x\to-\infty} \dfrac{e^x+x}{x^2-3x+1} \overset{\infty/\infty}{\underset{L'H}{=}} \lim_{x\to-\infty} \dfrac{e^x-1}{2x-3} = \lim_{x\to-\infty} \dfrac{e^x}{2} = \dfrac{0}{2} = \boxed{0}$

c) $\lim_{x\to0} \dfrac{x\operatorname{sen}x}{x} \underset{\text{Inf}}{=} \lim_{x\to0} \dfrac{x^2}{x} = \lim_{x\to0} x = \boxed{0}$

d) $\lim_{x\to1} \dfrac{3x^2-3}{x^2-3x+2} \overset{0/0}{\underset{L'H}{=}} \lim_{x\to1} \dfrac{6x}{2x-3} = \dfrac{6}{-1} = \boxed{-6}$

e) $\lim_{x\to1} 4\ln x - 3 = \boxed{-3}$

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f) $\lim_{x\to 3^+} \frac{\ln(x-3)}{\sqrt{x^2-9}} = \frac{-\infty}{+0} = \boxed{-\infty}$

g) $\lim_{x\to 0^+} x^2 \ln x = \underset{0\cdot\infty}{=} \lim_{x\to 0^+} \frac{\ln x}{\frac{1}{x^2}} \underset{\frac{\infty}{\infty}}{\overset{L'H}{=}} \lim_{x\to 0^+} \frac{\frac{1}{x}}{\frac{-2}{x^3}} = \lim_{x\to 0^+} \frac{x^3}{-2x} = \boxed{0}$

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

i) $\lim_{x\to -\infty} \sqrt{x^2-1} - \sqrt{x+1} \cdot \frac{\sqrt{x^2-1}+\sqrt{x+1}}{\sqrt{x^2-1}+\sqrt{x+1}} = \lim_{x\to -\infty} \frac{x^2-x-2}{\sqrt{x^2-1}+\sqrt{x+1}} = \lim_{x\to -\infty} \frac{1-\frac{1}{x}-\frac{2}{x^2}}{\sqrt{\frac{1}{x^2}-\frac{1}{x^4}}+\sqrt{\frac{1}{x^3}+\frac{1}{x^6}}} = \frac{1}{0} = \boxed{\infty}$

j) $\lim_{x\to -\infty} \left(\frac{x}{x+1}\right)^{2x} \underset{1^{\infty}}{=} e^{\lim_{x\to -\infty} 2x\left(\frac{x}{x+1}-1\right)} = e^{\lim_{x\to -\infty} \frac{-2x}{x+1}} = e^{-2} = \boxed{1/e^2}$

5) $f(x) = x^2 e^{x-1} \longrightarrow f(1) = 1$

$f'(x) = 2x e^{x-1} + x^2 e^{x-1} \longrightarrow f'(1) = 2+1 = 3$

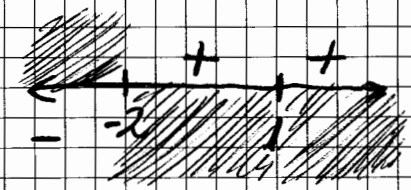
Recta Tg $y-1 = 3(x-1) \rightarrow \boxed{y = 3x-2}$

Recta Normal $y-1 = -\frac{1}{3}(x-1) \rightarrow 3y-3 = -x+1 \rightarrow \boxed{x+3y-4=0}$

6) a) $f(x) = (x-1)^2(x+2)$

$\text{Dom} f(x) = \mathbb{R}$

Corta OX $\rightarrow (x-1)^2(x+2) = 0 \begin{cases} x=1 \\ x=-2 \end{cases}$



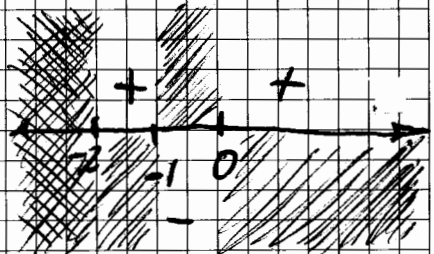
b) $g(x) = x^3 \ln(x+2)$

$\text{Dom} g(x) = (-2, \infty)$

OX: $x^3 \ln(x+2) = 0 \rightarrow x^3 = 0 \rightarrow x = 0$

$\ln(x+1) = 0 \rightarrow x+2 = 1$

$x = -1$



7) a) $f(x) = \frac{x+1}{x^2} \rightarrow \text{Dom} f(x) = \mathbb{R} - \{0\}$.

AV: $\boxed{x=0}$ $\lim_{x\to 0} \frac{x+1}{x^2} = \frac{1}{+0} = +\infty$

AH: $\boxed{y=0}$ $\lim_{x\to \pm\infty} \frac{x+1}{x^2} \underset{\frac{\infty}{\infty}}{\overset{L'H}{=}} \lim_{x\to \pm\infty} \frac{1}{2x} = \frac{1}{\infty} = \boxed{0}$

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b) $g(x) = \frac{\ln(x+3)}{x}$ → $\text{Dom } g(x) = (-3, 0) \cup (0, \infty)$

AV: $\boxed{x = -3, 0}$

$\lim_{x \to -3^+} \frac{\ln(x+3)}{x} = \frac{-\infty}{-3} = \infty$

$\lim_{x \to 0^-} \frac{\ln(x+3)}{x} = \frac{\ln 3}{-0} = -\infty$

$\lim_{x \to 0^+} \frac{\ln(x+3)}{x} = \frac{\ln 3}{+0} = +\infty$

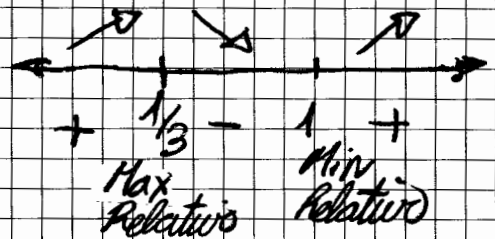
AH: $\boxed{y = 0}$ $\lim_{x \to -\infty} \frac{\ln(x+3)}{x} \overset{\frac{\infty}{\infty}}{\underset{L'H}{=}} \lim_{x \to -\infty} \frac{1}{x+3} = \frac{1}{\infty} = 0.$

En el $-\infty$ no se puede estudiar ya que ahí no existe la función

8) $f(x) = 2x^3 - 4x^2 + 2x + 15$ $\text{Dom } f(x) = \mathbb{R}$.

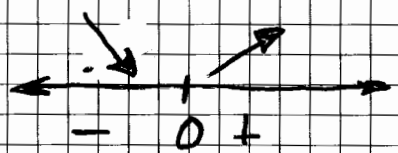
a) $f'(x) = 6x^2 - 8x + 2 = 0$

$3x^2 - 4x + 1 = 0$ → $x = \frac{4 \pm \sqrt{16-12}}{6} = \frac{4 \pm 2}{6}$ $\begin{cases} x = 1 \\ x = 1/3 \end{cases}$



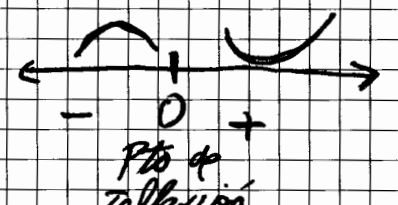
b) $g(x) = (x-1)e^x$ $\text{Dom } g(x) = \mathbb{R}$.

$g'(x) = e^x + (x-1)e^x = xe^x = 0$ → $x = 0$ ($e^x \neq 0$)



9) a) $f(x) = x^3 - 1$ → $\text{Dom } f(x) = \mathbb{R}$.

$f'(x) = 3x^2$ → $f''(x) = 6x = 0$ → $x = 0$



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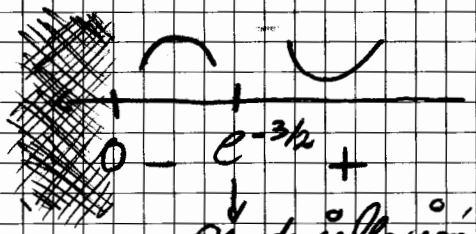
b) $g(x) = x^2 \ln x \longrightarrow \text{Dom } g(x) = (0, \infty)$

$g'(x) = 2x \ln x + x$

$g''(x) = 2\ln x + 2 + 1 = 0 \rightarrow \ln x = -3/2 \rightarrow x = e^{-3/2}$



Pto de inflexión