COLEGIO ALMA'S
bilingual school

Barranco del Negro s/n. Los Tabaibales.
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Corrección Examen 3ª Evaluación Matemáticas - 4ºESO - 08-06-18

1.-

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

2) $f'(x) = \frac{1}{2\sqrt{x}} 2^{\sqrt{x}} \ln 2$

3) $\ln f(x) = \frac{1}{3}(\ln \operatorname{tg} x - \ln(1+\cos x)) \rightarrow f'(x) = \frac{1}{3}\left(\frac{1+\operatorname{tg}^2 x}{\operatorname{tg} x} - \frac{\operatorname{sen} x}{1+\cos x}\right)\sqrt[3]{\frac{\operatorname{tg} x}{1+\cos x}}$

4) $f'(x) = 2(1+\operatorname{sen} x)(\cos x)$

5) $f'(x) = \ln(x+1) + \frac{x}{x+1}$

6) $f'(x) = \frac{\frac{1}{x^2+1}(3x+1) - 3\operatorname{arctg} x}{(3x+1)^2}$

2.-

1) $\lim_{x\to\infty} \frac{3x^2}{x^3-3x} = \left\{\frac{\infty}{\infty}\right\} \overset{L'H}{=} \lim_{x\to\infty} \frac{6x}{3x^2-3} = \left\{\frac{\infty}{\infty}\right\} \overset{L'H}{=} \lim_{x\to\infty} \frac{6}{6x} = \frac{6}{\infty} = \boxed{0}$

2) $\lim_{x\to -2} \frac{x+2}{x^2+4x+2} = \left\{\frac{0}{0}\right\} \overset{L'H}{=} \lim_{x\to -2} \frac{1}{2x+4} = \left\{\frac{1}{0}\right\}$ → $\lim_{x\to -2^-} \frac{1}{2x+4} = \frac{1}{-0} = -\infty$; $\lim_{x\to -2^+} \frac{1}{2x+4} = \frac{1}{+0} = +\infty$

No existe dicho límite

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

4) $\lim_{x\to-\infty} \frac{\ln(2x+1)}{x} = \left\{\frac{\infty}{\infty}\right\} \overset{L'H}{=} \lim_{x\to\infty} \frac{2}{2x+1} = \frac{2}{\infty} = \boxed{0}$

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

6) $\lim_{x\to 0^+} x e^{\frac{1}{x}} = \{0\cdot\infty\} = \lim_{x\to 0^+} \frac{e^{\frac{1}{x}}}{\frac{1}{x}} = \left\{\frac{\infty}{\infty}\right\} \overset{L'H}{=} \lim_{x\to 0^+} \frac{-\frac{1}{x^2}e^{\frac{1}{x}}}{-\frac{1}{x^2}} =$

$= \lim_{x\to 0^+} e^{\frac{1}{x}} = e^\infty = \boxed{\infty}$

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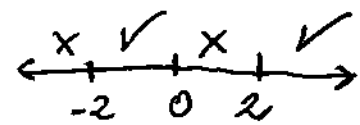
3) $\text{Dom}\left(\frac{3x-1}{x^2-x}\right) = \boxed{\mathbb{R}-\{0,1\}}$ $\quad x^2-x=0 \quad x(x-1)=0 \begin{cases} x=0 \\ x=1 \end{cases}$

$\text{Dom}\sqrt{x+\frac{4}{x}} = \boxed{[-2,0)\cup[2,\infty)}$ $\quad x+\frac{4}{x}\geq 0 \quad mcm=x$

$x^2+4=0 \rightarrow x=\pm 2$

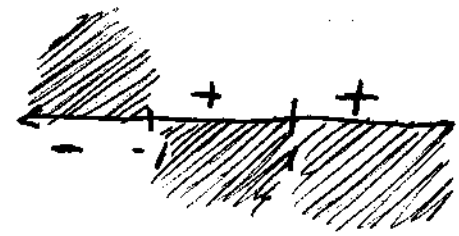


$\text{Dom}(x\cdot e^x) = \boxed{\mathbb{R}}$

$\text{Dom}\log(x^2-4x) = \boxed{(-\infty,0)\cup(4,\infty)}$ $\quad x^2-4x>0 \quad x(x-4)=0 \begin{cases} x=0 \\ x=4 \end{cases}$

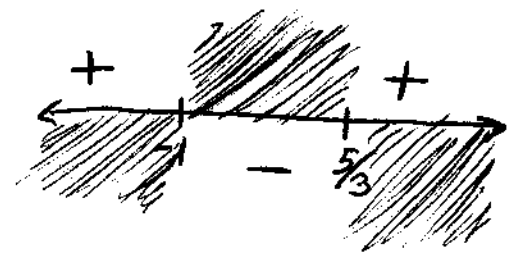
4) 1) $\text{Dom}(x-1)(x^2-1) = \mathbb{R}$.

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



2) $\text{Dom}\frac{3x-5}{x+1} = \mathbb{R}-\{-1\}$

$\frac{3x-5}{x+1}=0 \rightarrow 3x-5=0 \rightarrow x=5/3$



5) 1) $f(x)=(x-1)(x^2-1) \rightarrow$ es una rama parabólica, no posee asíntotas

2) $\text{Dom}\left(2x+\frac{x}{x+1}\right) = \mathbb{R}-\{-1\}$.

AV: $\boxed{x=-1}$

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

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

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AH: no tiene

$\lim_{x\to\pm\infty} 2x + \frac{x}{x+1} = \pm\infty + 1 = \pm\infty.$

AO: $\boxed{y = 2x+1}$

$m = \lim_{x\to\pm\infty} \frac{2x+\frac{x}{x+1}}{x} = \lim_{x\to\pm\infty} 2 + \frac{x}{x^2+x} = 2+0 = 2$

$n = \lim_{x\to\pm\infty} 2x + \frac{x}{x+1} - 2x = \lim_{x\to\pm\infty} \frac{x}{x+1} = 1$

6) 1) $Dom(x^3-12x) = \mathbb{R}$.

$f'(x) = 3x^2-12$

$3x^2-12=0 \longrightarrow x = \pm 2$

2) $Dom(xe^{-x}) = \mathbb{R}$

$f'(x) = 1\cdot e^{-x} - xe^{-x} = (1-x)e^{-x}$

$(1-x)e^{-x} = 0 \longrightarrow 1-x=0 \longrightarrow x=1$

7) $Dom(x^4-2x^3-x^2) = \mathbb{R}$.

1) $f'(x) = 4x^3-6x^2-2x$

$f''(x) = 12x^2-12x-2$

$12x^2-12x-2=0$

$6x^2-6x-1=0$

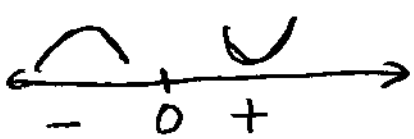
$x = \frac{6\pm\sqrt{36+24}}{12} = \frac{6\pm 2\sqrt{15}}{12} = \frac{3\pm\sqrt{15}}{6}$

Ptos de inflexión

2) $Dom\left(\frac{x^2+1}{x}\right) = \mathbb{R}-\{0\}$

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

$f''(x) = \frac{2}{x^3} \neq 0$ Sin Ptos de inflexión



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8.-

a)

Intervalos	f_i	F_i	h_i	H_i	x_i	$x_i f_i$	$x_i^2 f_i$	$\lvert x_i - \bar{x} \rvert f_i$
[2,4)	1	1	0'05	0'05	3	3	9	3'5
[4,6)	10	11	0'5	0'55	5	50	250	15
[6,8)	4	15	0'20	0'75	7	28	196	2
[8,10)	3	18	0'15	0'9	9	27	243	7'5
[10,12]	2	20	0'10	1	11	22	242	9
	$n=20$					130	940	37

b) $\bar{x} = \frac{130}{20} = 6'5$ $\quad Mo = 4 + (6-4)\frac{9}{9+6} = 5'2$ $\quad Me = 4 + (6-4)\frac{10-1}{11-1} = 5'8$

c) $Q_1 = 4 + (6-4)\frac{5-1}{11-1} = 4'8$ $\quad K_3 = 6 + (8-6)\frac{12-15}{15-11} = 6'5$

$D_5 = Me = 5'8$ $\quad P_{75} = Q_3 = 8 + (10-8)\frac{15-15}{18-15} = 8$

d) $R_I = Q_3 - Q_1 = 8 - 4'8 = 3'2$

$DM = \frac{37}{20} = 1'85$

e) $S_x = \sqrt{\frac{940}{20} - 6'5^2} = 2'18$

$CV = \frac{2'18}{6'5} = 0'34$

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9.-

a)

x	1	3	-2	5	6	2	
y	3	7	-4	11	13	5	
f_i	1	4	1	5	4	1	16
$x_i f_i$	1	12	-2	25	24	2	62
$x_i^2 f_i$	1	36	4	125	144	4	314
$y_i f_i$	3	28	-4	55	52	5	139
$y_i^2 f_i$	9	196	16	605	676	25	1527
$x_i y_i$	3	84	8	275	312	10	692

b) $\bar{x} = \frac{62}{16} = 3'875$ $\quad \bar{y} = \frac{139}{16} = 8'6875$

$S_x = \sqrt{\frac{314}{16} - 3'875^2} = 2'15$ $\quad S_y = \sqrt{\frac{1527}{16} - 8'6875^2} = 4'47$

c) $S_{xy} = \frac{692}{16} - 3'875 \cdot 8'6875 = 9'59$

$r = \frac{9'59}{2'15 \cdot 4'47} = 0'9979 \longrightarrow D = 99\%$ están relacionados

d) $\hat{y} = 8'6875 + \frac{9'59}{2'15^2}(4 - 3'875) \longrightarrow \hat{y} = 8'95$

e) $\hat{x} = 3'875 + \frac{9'59}{4'47^2}(1 - 8'6875) \longrightarrow \hat{x} = 0'19$