1 1 P - TE 3 : Fonctions EXP-LOG

EXERCICE 1

1) $\lim\limits_{x\to\infty} \frac{e^{3x}}{x^2} = \frac{0}{+\infty} = 0 \cdot 0 = 0$

2) $\lim\limits_{x\to+\infty} \frac{\ln(x^2-2)}{-3x+1} = \frac{+\infty}{-\infty} = +\infty \cdot 0$ mais comme le polynôme "court" plus vite

$\lim\limits_{x\to+\infty} f(x) = 0$

3) $\lim\limits_{x\to-\infty} e^x(x^5-1) = 0 \cdot (-\infty)$ mais e^x court plus vite

$\Rightarrow \lim\limits_{x\to-\infty} f(x) = 0$

4) $\lim\limits_{x\to 0^+} \frac{\ln(x)}{x^3} = \frac{-\infty}{0} = -\infty \cdot (+\infty) = -\infty$

EXERCICE 2

$f(x) = (x^2-1)e^{-3x} \qquad D_f = \mathbb{R}$

a) $\lim\limits_{x\to+\infty} f(x) = +\infty \cdot 0 = 0$ car e^{-3x} est plus "fort"

$\lim\limits_{x\to-\infty} f(x) = +\infty \cdot +\infty = +\infty$

b) $\cap Ox$: $f(x) = 0 \Rightarrow (x^2-1)e^{-3x} = 0 \Leftrightarrow x^2-1 = 0 \Leftrightarrow x = \pm 1$

$I_1(1;0) \quad I_2(-1;0)$

$\cap Oy$: $f(0) = -1\,e^0 = -1 \quad I_y(0;-1)$

c)

	$-\infty$		-1		1		$+\infty$
f		$+$	0	$-$	0	$+$	

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

EXERCICE 3

$f(x) = \ln(-2x^2 - 7x + 4)$

- $-2x^2 - 7x + 4 > 0$

$\Delta = 81 \quad x_{1,2} = \frac{7 \pm 9}{-4} = \begin{cases} x_1 = -4 \\ x_2 = \frac{1}{2} \end{cases}$

		-4		$1/2$	
	$-$	0	$+$	0	$-$

$D_f =]-4; 1/2[$

- $f'(x) = \frac{-4x - 7}{-2x^2 - 7x + 4}$

-2-

$\cdot\ f'(x) = 0 \iff -4x - 7 = 0 \iff x = -\frac{7}{4}$

$f\left(-\frac{7}{4}\right) = \ln(10.125)$

x	-4		$-7/4$		$1/2$
f'		$+$	0	$-$	
f		$\nearrow$	Max	$\searrow$	