N° 13 p 95

1. $f(x) = x^2 + x - 1$

- Limite en $+\infty$

$$\left.\begin{array}{l} \lim\limits_{x\to+\infty} x^2 = +\infty \\ \\ \lim\limits_{x\to+\infty} x - 1 = +\infty \end{array}\right\} \qquad \lim\limits_{x\to+\infty} f(x) = \lim\limits_{x\to+\infty} x^2 + x - 1 = +\infty$$

- Limite en $-\infty$

$$\left.\begin{array}{l} \lim\limits_{x\to-\infty} x^2 = +\infty \\ \lim\limits_{x\to-\infty} x - 1 = -\infty \end{array}\right\} \quad FI\ du\ type\ "\ \infty - \infty\ "$$

mais $\quad pour\ x \neq 0, \quad f(x) = x^2 + x - 1 = x^2\left(1 + \frac{1}{x} - \frac{1}{x^2}\right)$

or

$$\left.\begin{array}{l} \lim\limits_{x\to-\infty} x^2 = +\infty \\ \\ \lim\limits_{x\to-\infty} 1 + \frac{1}{x} - \frac{1}{x^2} = 1 \end{array}\right\} \quad \lim\limits_{x\to-\infty} f(x) = \lim\limits_{x\to-\infty} x^2\left(1 + \frac{1}{x} - \frac{1}{x^2}\right) = +\infty$$

2. $f(x) = x^3 - 3x^2 + 2$

- Limite en $+\infty$

$$\left.\begin{array}{l} \lim\limits_{x\to+\infty} x^3 = +\infty \\ \\ \lim\limits_{x\to+\infty} -3x^2 + 2 = -\infty \end{array}\right\} \quad FI\ du\ type\ "\ \infty - \infty\ "$$

mais $\quad pour\ x \neq 0, \quad f(x) = x^3 - 3x^2 + 2 = x^3\left(1 - \frac{3}{x} + \frac{2}{x^3}\right)$

or

$$\left.\begin{array}{l} \lim\limits_{x\to+\infty} x^3 = +\infty \\ \\ \lim\limits_{x\to+\infty} 1 - \frac{3}{x} + \frac{2}{x^3} = 1 \end{array}\right\} \quad \lim\limits_{x\to+\infty} f(x) = \lim\limits_{x\to+\infty} x^3\left(1 - \frac{3}{x} + \frac{2}{x^3}\right) = +\infty$$

- Limite en $-\infty$

$$\left.\begin{array}{l} \lim\limits_{x\to-\infty} x^3 = -\infty \\ \lim\limits_{x\to-\infty} -3x^2 + 2 = -\infty \end{array}\right\} \quad \lim\limits_{x\to-\infty} f(x) = -\infty$$

N° 16 p 95

- Limite en $+\infty$

$\lim\limits_{x\to+\infty} \frac{x^2+1}{1-x}$: FI du type « $\frac{\infty}{\infty}$ » mais pour $x \neq 0$, $\frac{x^2+1}{1-x} = \frac{x^2\left(1+\frac{1}{x^2}\right)}{x\left(\frac{1}{x}-1\right)} = \frac{x(1+\frac{1}{x^2})}{\frac{1}{x}-1}$

or $\lim\limits_{x\to+\infty} x = +\infty$

$\lim\limits_{x\to+\infty} 1+\frac{1}{x^2} = 1$

$\lim\limits_{x\to+\infty} x\left(1+\frac{1}{x^2}\right) = +\infty$

$\lim\limits_{x\to+\infty} \frac{1}{x} - 1 = -1$

donc par quotient

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

- Limite en $-\infty$

$\lim\limits_{x\to-\infty} \frac{x^2+1}{1-x}$: FI du type « $\frac{\infty}{\infty}$ » mais pour $x \neq 0$, $\frac{x^2+1}{1-x} = \frac{x^2\left(1+\frac{1}{x^2}\right)}{x\left(\frac{1}{x}-1\right)} = \frac{x(1+\frac{1}{x^2})}{\frac{1}{x}-1}$

or $\lim\limits_{x\to-\infty} x = -\infty$

$\lim\limits_{x\to-\infty} 1+\frac{1}{x^2} = 1$

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

$\lim\limits_{x\to-\infty} \frac{1}{x} - 1 = -1$

donc par quotient

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

N° 19 p 95

1. $\lim\limits_{\substack{x\to2\\x>2}} \frac{-3x}{2x-4}$:

$\lim\limits_{\substack{x\to2\\x>2}} -3x = -6$

$\lim\limits_{\substack{x\to2\\x>2}} 2x-4 = 0$

$si\ x > 2 \quad alors \quad 2x-4 > 0$

donc par quotient , $\lim\limits_{\substack{x\to2\\x>2}} \frac{-3x}{2x-4} = -\infty$

2. $\lim\limits_{\substack{x \to 2 \\ x<2}} \frac{-3x}{2x-4}$:

$$\left.\begin{array}{l} \lim\limits_{\substack{x \to 2 \\ x<2}} -3x = -6 \\ \\ \lim\limits_{\substack{x \to 2 \\ x<2}} 2x-4 = 0 \\ \\ si\ x<2 \quad alors \quad 2x-4<0 \end{array}\right\} \text{ donc par quotient , } \lim\limits_{\substack{x \to 2 \\ x<2}} \frac{-3x}{2x-4} = +\infty$$

<u>N° 55 p 98</u>

<u>1.</u> $f(x) = \frac{3e^x + 1}{1+e^x}$

- Limite en $+\infty$

$\lim\limits_{x \to +\infty} \frac{3e^x + 1}{1+e^x}$: FI du type « $\frac{\infty}{\infty}$ » mais , $f(x) = \frac{3e^x+1}{1+e^x} = \frac{e^x\left(3+\frac{1}{e^x}\right)}{e^x\left(\frac{1}{e^x}+1\right)} = \frac{3+\frac{1}{e^x}}{\frac{1}{e^x}+1}$

or $\lim\limits_{x \to +\infty} e^x = +\infty$ donc $\lim\limits_{x \to +\infty} \frac{1}{e^x} = 0$

$$\text{ainsi} \quad \left.\begin{array}{l} \lim\limits_{x \to +\infty} 3 + \frac{1}{e^x} = 3 \\ \\ \lim\limits_{x \to +\infty} \frac{1}{e^x} + 1 = 1 \end{array}\right\} \text{ donc par quotient } \lim\limits_{x \to +\infty} f(x) = \lim\limits_{x \to +\infty} \frac{3+\frac{1}{e^x}}{\frac{1}{e^x}+1} = 3$$

- Limite en $-\infty$

On a $\lim\limits_{x \to -\infty} e^x = 0$

$$\text{ainsi} \quad \left.\begin{array}{l} \lim\limits_{x \to -\infty} 3e^x + 1 = 1 \\ \\ \lim\limits_{x \to -\infty} 1+e^x = 1 \end{array}\right\} \text{ donc par quotient } \lim\limits_{x \to -\infty} f(x) = \lim\limits_{x \to -\infty} \frac{3e^x+1}{1+e^x} = 1$$

6. $k(x) = (e^x - 5)(x+700)$

- Limite en $+\infty$

$$\left.\begin{array}{l} \lim\limits_{x \to +\infty} e^x - 5 = +\infty \\ \\ \lim\limits_{x \to +\infty} x + 700 = +\infty \end{array}\right\} \text{ Par produit, } \lim\limits_{x \to +\infty} k(x) = +\infty$$

- Limite en $-\infty$ (On a $\lim_{x \to -\infty} e^x = 0$)

$$\left.\begin{array}{l} \lim_{x \to -\infty} e^x - 5 = -5 \\ \\ \lim_{x \to -\infty} x + 700 = -\infty \end{array}\right\} \text{Par produit, } \lim_{x \to -\infty} k(x) = +\infty$$