

T → Serie!

ex 1:

$$1) f_1(x) = \frac{x}{\sqrt{1+x^2} - \sqrt{1+x}}$$

$$\Rightarrow \sqrt{1+x^2} - \sqrt{1+x} \neq 0$$

x should not be 0 or 1

$\Rightarrow x$ should not be $[-1, 1]$

$$\Leftrightarrow Df_1 =]-1; +\infty[\setminus (0, 1)$$

$$\left(Df_1^2 = \left\{]-1; 0[\cup]0; 1[\cup \right. \right. \\ \left. \left.]1; +\infty[\setminus (0, 1) \right\} \right)$$

$$2) f_2(x) = \ln(1+x^3) + x - 1$$

$$Df_2 =]-1; +\infty[$$

$$3) f_3(x) = \frac{\ln(x)}{\sqrt{x^2} - 4} \quad x \neq 0$$

$\Leftrightarrow x$ should not be 2

$$\Leftrightarrow Df_3 =]2; +\infty[\setminus (2, -2)$$

$$f_4(x) = \sqrt{|x+2| - |2x-4|}$$

$$\Leftrightarrow |x+2| - |2x-4| \geq 0.$$

$$\Leftrightarrow |x+2| = |2x-4|$$

$$\Leftrightarrow x+2 = 2x-4$$

$$\Leftrightarrow x = 2x-4-2$$

$$\Leftrightarrow x = 2x-6$$

$$\lim_{x \rightarrow 0} \frac{x - \ln(1+x)}{x^2}$$

$$\Leftrightarrow x \left(\frac{1 - \ln(1+x)}{x} \right)$$

les primitives :

I -

$$x^m = \frac{x^{m+1}}{m+1}$$

ex :

• $f(x) = 5x^4, F(x) = \frac{5x^5}{5} = x^5$) To verify the process.

• $f(x) = x^3 - 2x,$

$$F(x) = \frac{x^4}{4} - x^2 + C$$

• $f(x) = 5x - 3 = \frac{5}{2}x^2 - 3x$

II

$$\frac{1}{x^2} = -\frac{1}{x}$$

1) $f(x) = \frac{-3}{x^2}, F(x) = \frac{3}{x}$

2) $f(x) = \frac{5}{x^2} \Rightarrow F(x) = \left(5 \cdot \frac{1}{x^2} \right)_{\text{prim}}$

$$F(x) = -\frac{5}{x}$$

3) $f(x) = 4x - \frac{1}{x^2} \Rightarrow F(x) = \frac{4x^2}{2} + \frac{1}{x}$

$$= 2x^2 + \frac{1}{x}$$

$$\text{III)} \quad \frac{1}{x} = \ln(x)$$

$$e^x = e^x$$

$$1) f(x) = -\frac{2}{x} = -2 \frac{1}{x}, \quad F(x) = -2 \ln(x)$$

$$2) f(x) = 4e^x, \quad F(x) = 4e^x$$

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

$$\Rightarrow F(x) = 3 \ln(x) - \frac{1}{x}$$

$$\text{IV)} \quad u' e^u = e^u$$

$$1) f(x) = x e^{x^2} = \frac{1}{2} \cdot 2x e^{x^2}, \quad F(x) = \frac{e^{x^2}}{2}$$

$$2) f(x) = e^{4x+1} = \frac{1}{4} \cdot 4 e^{4x+1} = \frac{1}{4} e^{4x+1}$$

$$\text{V)}$$

Fonction	Une primitive.
$u^m \text{ avec } m \neq -1$	$\frac{1}{m+1} u^{m+1}$
$\frac{u'}{2\sqrt{u}}$	\sqrt{u}
$\frac{u'}{u}$	$\ln(u)$
$u' e^u$	e^u
$u' \cos(u)$	$\sin(u)$
$u' \sin(u)$	$-\cos(u)$

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

$(x^2+1)' = 2x$, so let's add 2.

$$\frac{2x}{2\sqrt{x^2+1}} = f(x).$$

$$F(x) = \sqrt{x^2+1}$$

$$\sin \cos.$$

$$2) f(x) = \cos(2x) - 3\sin(3x-1)$$

$$\left\{ \begin{array}{l} \cos(2x) \rightarrow -\sin(2x) \\ \sin(3x-1) \Rightarrow \cos(3x-1) \end{array} \right.$$

$$= -\frac{\sin(2x)}{2} + \cos(3x-1)$$

Methode 2°

$$f(x) = \cos(2x) - 3\sin(3x-1)$$

$$= \frac{1}{2} \cdot 2 \cos(2x) - 3\sin(3x-1)$$

$$\Rightarrow F(x) = \frac{1}{2} \sin(2x) + \cos(3x-1)$$

$$3) f(x) = \frac{3x}{x^2+2} = \frac{3}{2} \cdot \frac{2x}{x^2+2} \Rightarrow F(x) = \frac{3}{2} \ln(x^2+2)$$

$$u = x^2+1, u' = 2x$$

Intégrale :

I) Intégration par partie :

Soit la formule suivante :

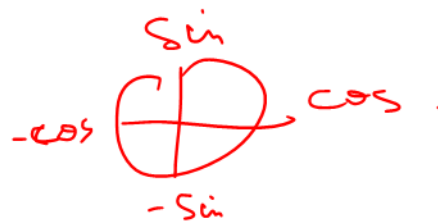
$$A = \int \underbrace{x}_v \frac{\sin(x)}{\underbrace{u'}} dx$$

$$v = x$$

$$v' = 1$$

$$u' = \sin(x)$$

$$u = -\cos(x)$$



$$A = a \cdot c - \int b \cdot c dx$$

$$\Rightarrow A = -x \cos(x) - \int -\cos(x) dx$$

$$= -x \cos(x) + \int \cos(x) dx$$

$$= -x \cos(x) + \sin(x) + C$$

$C \Rightarrow \text{constante}$

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

Soit $g(x) = x^2 + 1$, $g'(x) = 2x$ (équilibre).

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

Exercice 2

$$\frac{(at+b)^{m+1}}{m+1}$$

2)

$$\int \frac{t^3 \sin(t^2)}{u} dt$$

$$u = t^3$$

Intégrale avec changement de
variable.

