Analyse

Calcul différentiel & Intégral

$$(x^2)' = 2x^1$$

'TECH.' → dérivée

Primitive

$$(x^n)' = nx^{n-1}$$

ART. ← Calculer une primitive

Not.

$$\int x^3 \, dx = \underbrace{\frac{1}{4}x^4 + C}_{F(x)}$$

$\int$ ← primitive

dx → dx

$$F'(x) = x^3$$

$$\left(\frac{1}{4}x^4 + 18\right)' = \frac{1}{4} \cdot 4 \cdot x^3 + \underbrace{(18)'}_{0}$$

$$= x^3$$

$$\int \sin x \, dx = -\cos x + c \qquad \int 1 \, dx = x + c$$

$$\int \cos x \, dx = \sin x + c$$

$$\int x^n \, dx = \frac{1}{n+1} x^{n+1} + c$$

$$\int \frac{1}{x} \, dx = \ln x + c \qquad \int e^x \, dx = e^x + c$$

$$\int \frac{x^2+2x-1}{x^2+1}\,dx$$

$$\int k \cdot f = k \cdot \int f \qquad k \in \mathbb{R}$$

$$\int (f+g) = \int f + \int g$$

$\int$ est un opérateur linéaire sur $C_0(\mathbb{R}; \mathbb{R})$

$$\int f(g(x))\, g'(x)\, dx = F(g(x))$$

avec $F'(x) = f(x)$

$$\int \sqrt{x^2+1}\; dx$$

$$-\frac{2}{\sqrt{x^7}} = -\frac{2}{x^{7/2}} = -2 \cdot x^{-7/2} = F(x)$$

$$F'(x) = f(x)$$

$$-\frac{7}{2} - 1$$

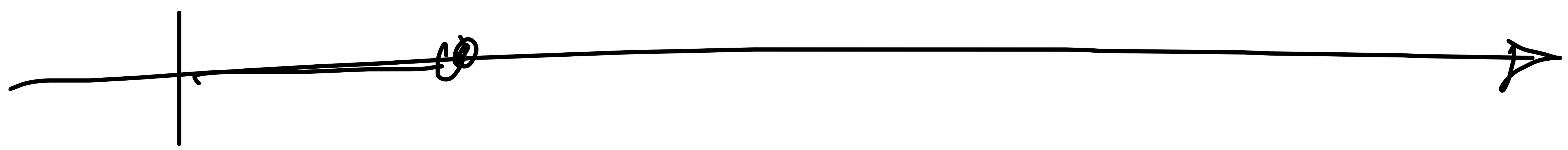
$$F'(x) = -2 \cdot -\frac{7}{2} \cdot x^{-\frac{7}{2}-1}$$

$$= 7x^{-\frac{9}{2}} = \frac{7}{\sqrt{x^9}}$$

$$(x^n)' = n x^{n-1} \qquad -2 \cdot x^{\left(-\frac{7}{2}\right)}$$

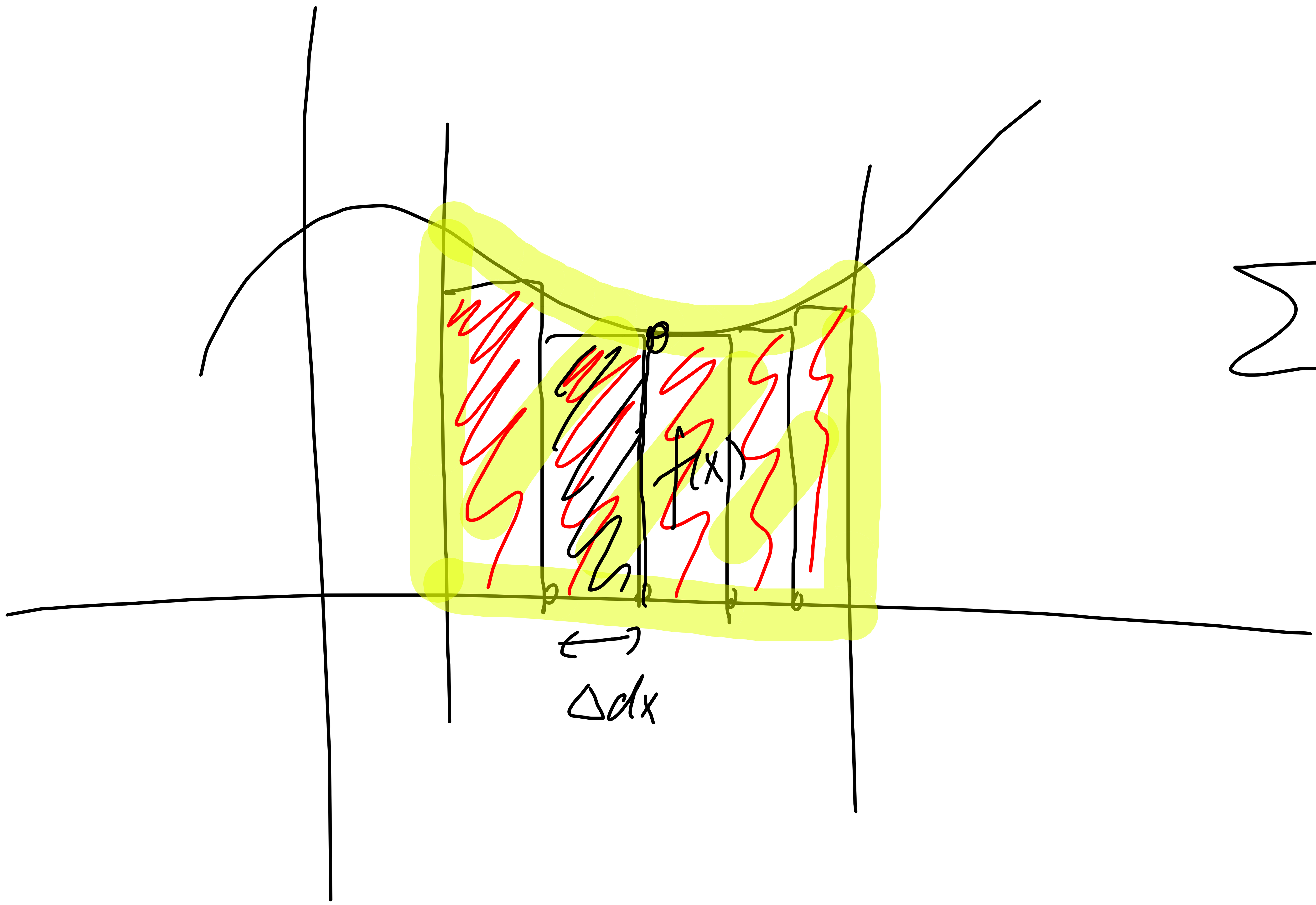
$$\frac{1}{2^n} = 2^{-n}$$

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



$f(x)$

$$f(x) = k \cdot f'(x)$$



$$\sum f(x) \cdot \Delta x \simeq \text{AIRE JAUNE}$$

$\Delta x \to 0$

$$\int f(x) \cdot dx = F(x) + c$$

$$\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$$

2.2.1 à 2.2.4 (Calcul direct)

→ Mercredi 28/08/2024

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

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

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

$$(f(g(x)))' = f'(g(x)) \cdot g'(x)$$

$$\left(\sqrt{\frac{x-1}{x+1}}\right)' = \frac{1}{2}\left(\frac{x-1}{x+1}\right)^{-\frac{1}{2}} \cdot \left(\frac{x-1}{x+1}\right)'$$

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

$$= \frac{1}{2} \cdot \frac{2}{\sqrt{\frac{x-1}{x+1}} \cdot \sqrt{(x+1)^4}}$$

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

$$\int (1+\tan^2 x)\,dx = \tan x + C$$

$( )'$

$$(\tan x)' = \left(\frac{\sin x}{\cos x}\right)' = \frac{\cos x \cos x - \sin x(-\sin x)}{\cos^2 x}$$

$$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$$

$$= 1 + \frac{\sin^2 x}{\cos^2 x} = 1+\tan^2 x$$

$$\int \frac{dx}{x^2} = \int \frac{1}{x^2}\,dx = \int x^{-2}\,dx$$

$$\left(x^n\right)' = n \cdot x^{n-1}$$

$$\int x^n\,dx = \frac{1}{n+1}\,x^{n+1} + C$$

$$\int \frac{2\,dx}{x^3} = \int \frac{2}{1} \cdot \frac{1}{x^3} \cdot dx$$

$$= \frac{2}{1} \int x^{-3}\,dx = 2 \int x^{-3}\,dx$$

$$\frac{2\sqrt{x+1} - x\frac{1}{\sqrt{x+1}}}{x+1} =$$

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

$$(x+1)\sqrt{x+1} = \sqrt{(x+1)^3}$$ car $a\sqrt{a} = \sqrt{a^2 \cdot a}$

$$\left(-3\left(x^2+7x+2\right)^{-\frac{1}{3}}\right)'$$