

Formulaire de Dérivation

Récapitulatif des formules de dérivées

Conventions : $u = u(x)$ et $v = v(x)$ sont des fonctions dérivables, a, c, n, α des constantes, et $f' = \frac{df}{dx}$.

1. Règles générales

$$(c)' = 0$$

$$(au)' = a u'$$

$$(u + v)' = u' + v'$$

$$(u - v)' = u' - v'$$

$$(uv)' = u'v + uv'$$

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

$$\left(\frac{1}{v}\right)' = -\frac{v'}{v^2}$$

$$(uvw)' = u'vw + uv'w + uvw'$$

$$(u^n)' = n u^{n-1} u'$$

$$(f \circ u)' = (f' \circ u) \cdot u'$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

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

$$\left(\frac{uv}{v}\right)' = \frac{u'}{u} + \frac{v'}{v}$$

$$(u^v)' = u^v \left(v' \ln u + v \frac{u'}{u} \right)$$

$$(uv)^{(n)} = \sum_{k=0}^n \binom{n}{k} u^{(k)} v^{(n-k)}$$

2. Fonctions usuelles

$$(x)' = 1$$

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

$$(x^\alpha)' = \alpha x^{\alpha-1}$$

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

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

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

$$(\sqrt[n]{x})' = \frac{1}{n} x^{\frac{1}{n}-1}$$

$$(|x|)' = \frac{x}{|x|} \quad (x \neq 0)$$

3. Exponentielles et logarithmes

$$(e^x)' = e^x$$

$$(a^x)' = a^x \ln a$$

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

$$(\ln|x|)' = \frac{1}{x}$$

$$(\log_a x)' = \frac{1}{x \ln a}$$

$$(e^u)' = u' e^u$$

$$(a^u)' = u' a^u \ln a$$

$$(\ln u)' = \frac{u'}{u}$$

$$(\log_a u)' = \frac{u'}{u \ln a}$$

4. Fonctions trigonométriques

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

$$(\cos x)' = -\sin x$$

$$(\tan x)' = 1 + \tan^2 x = \frac{1}{\cos^2 x}$$

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

$$(\sec x)' = \sec x \tan x$$

$$(\csc x)' = -\csc x \cot x$$

5. Fonctions trigonométriques réciproques

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

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

$$(\arctan x)' = \frac{1}{1+x^2}$$

$$\operatorname{arccot}'(x) = -\frac{1}{1+x^2}$$

$$\operatorname{arcsec}'(x) = \frac{1}{|x|\sqrt{x^2-1}}$$

$$\operatorname{arccsc}'(x) = -\frac{1}{|x|\sqrt{x^2-1}}$$

6. Fonctions hyperboliques

$$(\sinh x)' = \cosh x$$

$$(\cosh x)' = \sinh x$$

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

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

$$\operatorname{sech}'(x) = -\operatorname{sech} x \tanh x$$

$$\operatorname{csch}'(x) = -\operatorname{csch} x \coth x$$

7. Fonctions hyperboliques réciproques

$$(\operatorname{argsinh} x)' = \frac{1}{\sqrt{x^2+1}}$$

$$(\operatorname{argcosh} x)' = \frac{1}{\sqrt{x^2-1}}$$

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

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

$$(\operatorname{argsech} x)' = -\frac{1}{x\sqrt{1-x^2}}$$

$$(\operatorname{argcsch} x)' = -\frac{1}{|x|\sqrt{1+x^2}}$$

8. Formes composées (avec $u = u(x)$)

$$(u^n)' = n u^{n-1} u'$$

$$(\sqrt{u})' = \frac{u'}{2\sqrt{u}}$$

$$\left(\frac{1}{u}\right)' = -\frac{u'}{u^2}$$

$$(e^u)' = u' e^u$$

$$(\ln u)' = \frac{u'}{u}$$

$$(a^u)' = u' a^u \ln a$$

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

$$(\cos u)' = -u' \sin u$$

$$(\tan u)' = \frac{u'}{\cos^2 u}$$

$$(\cot u)' = -\frac{u'}{\sin^2 u}$$

$$(\arcsin u)' = \frac{u'}{\sqrt{1-u^2}}$$

$$(\arccos u)' = -\frac{u'}{\sqrt{1-u^2}}$$

$$(\arctan u)' = \frac{u'}{1+u^2}$$

$$(\sinh u)' = u' \cosh u$$

$$(\cosh u)' = u' \sinh u$$

$$(\tanh u)' = \frac{u'}{\cosh^2 u}$$