

## Règles et formules de dérivation

## Règles de dérivation

Notation de Lagrange

1.  $(cf)' = cf'$
2.  $(af \pm bg)' = af' \pm bg'$
3.  $(fg)' = f'g + fg'$
4.  $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$
5.  $(f(g))' = f'(g) g'$

Notation de Leibniz

6.  $\frac{dc}{dx} = 0$
7.  $\frac{d}{dx}(af \pm bg) = a\frac{df}{dx} \pm b\frac{dg}{dx}$
8.  $\frac{d(fg)}{dx} = g\frac{df}{dx} + f\frac{dg}{dx}$
9.  $\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{g\frac{df}{dx} - f\frac{dg}{dx}}{g^2(x)}$
10.  $\frac{dy}{dx} = \frac{dy}{du} \frac{du}{dx}$

## Formules de dérivation

1.  $\frac{d}{dx}c = 0$
2.  $\frac{d}{dx}x = 1$
3.  $\frac{d}{dx}u^n = nu^{n-1}\frac{du}{dx}$
4.  $\frac{d}{dx}a^u = a^u \ln(a)\frac{du}{dx}$   
 $\frac{d}{dx}e^u = e^u\frac{du}{dx}$
5.  $\frac{d}{dx}\log_a(u) = \frac{1}{u \ln(a)}\frac{du}{dx}$   
 $\frac{d}{dx}\ln(u) = \frac{1}{u}\frac{du}{dx}$
6.  $\frac{d}{dx}\sin(u) = \cos(u)\frac{du}{dx}$
7.  $\frac{d}{dx}\cos(u) = -\sin(u)\frac{du}{dx}$
8.  $\frac{d}{dx}\tan(u) = \sec^2(u)\frac{du}{dx}$
9.  $\frac{d}{dx}\cot(u) = -\csc^2(u)\frac{du}{dx}$
10.  $\frac{d}{dx}\sec(u) = \sec(u)\tan(u)\frac{du}{dx}$
11.  $\frac{d}{dx}\csc(u) = -\csc(u)\cot(u)\frac{du}{dx}$
12.  $\frac{d}{dx}\arcsin(u) = \frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$   
 $\frac{d}{dx}\arccos(u) = \frac{-1}{\sqrt{1-u^2}}\frac{du}{dx}$
13.  $\frac{d}{dx}\arctan(u) = \frac{1}{1+u^2}\frac{du}{dx}$   
 $\frac{d}{dx}\text{arccot}(u) = \frac{-1}{1+u^2}\frac{du}{dx}$
14.  $\frac{d}{dx}\text{arcsec}(u) = \frac{1}{u\sqrt{u^2-1}}\frac{du}{dx}$   
 $\frac{d}{dx}\text{arccsc}(u) = \frac{-1}{u\sqrt{u^2-1}}\frac{du}{dx}$
15.  $\frac{d}{dx}|u| = \frac{|u|}{u}\frac{du}{dx}$
16.  $e^{\frac{d}{dx}u^v} = u^v \left[ \frac{v}{u}\frac{du}{dx} + \ln(u)\frac{dv}{dx} \right]$

Exercices de révision

Calculer, et simplifier, la dérivée des fonctions suivantes. (Exercices manu scriptus)

1.  $f(x) = \frac{1}{2}x^3e^{2x} - \frac{3}{4}x^2e^{2x} + \frac{3}{4}xe^{2x} - \frac{3}{8}e^{2x}$
2.  $f(x) = \ln(x + \sqrt{x^2 + 1})$
3.  $f(x) = \frac{1 - \cos(3x)}{3 \sin(3x)}$
4.  $f(x) = x \arccos(2x) - \frac{\sqrt{1 - 4x^2}}{2}$
5.  $f(x) = \frac{1}{2} [\sec(x) \tan(x) + \ln(\sec(x) + \tan(x))]$
6.  $f(x) = \frac{1}{50}(25x^2 + 1)\arctan(5x) - \frac{x}{10}$
7.  $f(x) = \ln \left( \sqrt{\frac{1 - \cos(x)}{1 + \cos(x)}} \right)$
8.  $f(x) = \ln(x^x)$
9.  $f(x) = (\ln(x))^x$
10.  $x = \arccos \left( \frac{1}{t} \right)$

$$\left. \begin{aligned} 0 > t & \left\{ \frac{1 - \frac{1}{t^2} \wedge t}{1 - \frac{1}{t^2} \wedge t} \right\} = \frac{tp}{xp} \cdot 0I \\ 0 < t & \left\{ \frac{1 - \frac{1}{t^2} \wedge t}{1} \right\} = \frac{tp}{xp} \cdot 0I \end{aligned} \right\}$$

$$\left[ \frac{(x) \ln \ln + \frac{(x) \ln 1}{1} \right]_x ((x) \ln) = (x) \cdot 6$$

$$(x) \ln + 1 = (x) \cdot 8$$

$$(x) \csc = (x) \cdot 7$$

$$(x) \arctan = (x) \cdot 9$$

$$(x) \sec = (x) \cdot 5$$

$$(x) \arccos(2x) = (x) \cdot 4$$

$$\frac{(x) \csc + 1}{1} = (x) \cdot 3$$

$$\frac{1 + \frac{1}{t^2} \wedge x}{1} = (x) \cdot 2$$

$$x^2 e^x = (x) \cdot 1$$