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. $\frac{d}{dx}\arctan(u) = \frac{1}{1+u^2}\frac{du}{dx}$
    $\frac{d}{dx}\operatorname{arccot}(u) = \frac{-1}{1+u^2}\frac{du}{dx}$
14. $\frac{d}{dx}\operatorname{arcsec}(u) = \frac{1}{u\sqrt{u^2-1}}\frac{du}{dx}$
    $\frac{d}{dx}\operatorname{arccsc}(u) = \frac{-1}{u\sqrt{u^2-1}}\frac{du}{dx}$
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. $\mathrm{f}(x) = \dfrac{1}{2}x^3e^{2x} - \dfrac{3}{4}x^2e^{2x} + \dfrac{3}{4}xe^{2x} - \dfrac{3}{8}e^{2x}$
2. $\mathrm{f}(x) = \ln(x + \sqrt{x^2+1})$
3. $\mathrm{f}(x) = \dfrac{1-\cos(3x)}{3\sin(3x)}$
4. $\mathrm{f}(x) = x\arccos(2x) - \dfrac{\sqrt{1-4x^2}}{2}$
5. $\mathrm{f}(x) = \dfrac{1}{2}\left[\sec(x)\tan(x) + \ln(\sec(x)+\tan(x)\right]$
6. $\mathrm{f}(x) = \dfrac{1}{50}(25x^2+1)\arctan(5x) - \dfrac{x}{10}$
7. $\mathrm{f}(x) = \ln\left(\sqrt{\dfrac{1-\cos(x)}{1+\cos(x)}}\right)$
8. $\mathrm{f}(x) = \ln(x^x)$
9. $\mathrm{f}(x) = (\ln(x))^x$
10. $x = \arccos\left(\dfrac{1}{t}\right)$

1. $\mathrm{f}'(x) = x^3e^{2x}$
2. $\mathrm{f}'(x) = \dfrac{1}{\sqrt{x^2+1}}$
3. $\mathrm{f}'(x) = \dfrac{1}{1+\cos(3x)}$
4. $\mathrm{f}'(x) = \arccos(2x)$
5. $\mathrm{f}'(x) = \sec^3(x)$
6. $\mathrm{f}'(x) = x\arctan(5x)$
7. $\mathrm{f}'(x) = \csc(x)$
8. $\mathrm{f}'(x) = 1 + \ln(x)$
9. $\mathrm{f}'(x) = (\ln(x))^x\left[\dfrac{1}{\ln(x)} + \ln(\ln(x))\right]$
10. $\dfrac{dx}{dt} = \begin{cases} \dfrac{1}{t\sqrt{t^2-1}}, & t > 0; \\ \dfrac{-1}{t\sqrt{t^2-1}}, & t < 0. \end{cases}$