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Transformation des dérivées et différentielles

x	Variable indépendante
a	Constante quelconque
f, u, v, w	Fonction quelconque de x
n	Nombre naturel

Règles de calcul :

Différentielle : définition	$du = \frac{d}{dx} u \cdot dx$
Inversion	$\frac{d}{dv} u = 1 \Big/ \frac{d}{du} v \qquad \text{si} \qquad \frac{d}{du} v \neq 0$
Composition	$\frac{d}{dx} f(u) = \frac{d}{du} f(u) \cdot \frac{d}{dx} u$
Mise en évidence d'une constante	$\frac{d}{dx} a \cdot u = a \cdot \frac{d}{dx} u$
Addition de fonctions	$\frac{d}{dx}(u+v) = \frac{d}{dx} u + \frac{d}{dx} v$
Multiplication de fonctions	$\frac{d}{dx}(u \cdot v) = u \cdot \frac{d}{dx} v + v \cdot \frac{d}{dx} u$
Division de fonctions	$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{1}{v} \cdot \frac{d}{dx} u - \frac{u}{v^2} \cdot \frac{d}{dx} v$
Exposition de fonctions	$\frac{d}{dx}(u^v) = v \cdot u^{v-1} \cdot \frac{d}{dx} u + \ln(u) \cdot u^v \cdot \frac{d}{dx} v$
Dérivées seconde et multiple	$\frac{d}{dx}\frac{d}{dx} u = \frac{d^2}{dx^2} u \qquad \frac{d}{dx} \ldots \frac{d}{dx} u = \frac{d^n}{dx^n} u$
	$\frac{d^2}{dx^2} f(u) = \frac{d}{du} f(u) \cdot \frac{d^2}{dx^2} u + \frac{d^2}{du^2} f(u) \cdot \left(\frac{d}{dx} u\right)^2$

Fonction	Calcul en x	Forme composée
Constante	$\frac{d}{dx}a = 0$	-
Identité	$\frac{d}{dx}(a \cdot x) = a$	$\frac{d}{dx}(a \cdot u) = a \cdot \frac{d}{dx}u$
Carré	$\frac{d}{dx}x^2 = 2 \cdot x$	$\frac{d}{dx}u^2 = 2 \cdot u \cdot \frac{d}{dx}u$
Inverse	$\frac{d}{dx}\frac{1}{x} = -\frac{1}{x^2}$	$\frac{d}{dx}\frac{1}{u} = -\frac{1}{u^2} \cdot \frac{d}{dx}u$
Racine carrée	$\frac{d}{dx}\sqrt{x} = \frac{1}{2 \cdot \sqrt{x}}$	$\frac{d}{dx}\sqrt{u} = \frac{1}{2 \cdot \sqrt{u}} \cdot \frac{d}{dx}u$
Puissance	$\frac{d}{dx}x^n = n \cdot x^{n-1}$	$\frac{d}{dx}u^n = n \cdot u^{n-1} \cdot \frac{d}{dx}u$
Logarithme népérien	$\frac{d}{dx}\ln(x) = \frac{1}{x}$	$\frac{d}{dx}\ln(u) = \frac{1}{u} \cdot \frac{d}{dx}u$
Logarithme quelconque	$\frac{d}{dx}\log_a(x) = \frac{1}{\ln(a)} \cdot \frac{1}{x}$	$\frac{d}{dx}\log_a(u) = \frac{1}{\ln(a)} \cdot \frac{1}{u} \cdot \frac{d}{dx}u$
Exponentielle	$\frac{d}{dx}e^x = e^x$	$\frac{d}{dx}e^u = e^u \cdot \frac{d}{dx}u$
Exponentielle quelconque	$\frac{d}{dx}a^x = a^x \cdot \ln(a)$	$\frac{d}{dx}a^u = \ln(a) \cdot a^u \cdot \frac{d}{dx}u$
Sinus	$\frac{d}{dx}\sin(x) = \cos(x)$	$\frac{d}{dx}\sin(u) = \cos(u) \cdot \frac{d}{dx}u$
Cosinus	$\frac{d}{dx}\cos(x) = -\sin(x)$	$\frac{d}{dx}\cos(u) = -\sin(u) \cdot \frac{d}{dx}u$
Tangente	$\frac{d}{dx}\tan(x) = \frac{1}{\cos^2(x)}$	$\frac{d}{dx}\tan(u) = \frac{1}{\cos^2(u)} \cdot \frac{d}{dx}u$
Cotangente	$\frac{d}{dx}\cot(x) = -\frac{1}{\sin^2(x)}$	$\frac{d}{dx}\cot(u) = -\frac{1}{\sin^2(u)} \cdot \frac{d}{dx}u$
Sinus inverse	$\frac{d}{dx}\arcsin(x) = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\arcsin(u) = \frac{1}{\sqrt{1-u^2}} \cdot \frac{d}{dx}u$
Cosinus inverse	$\frac{d}{dx}\arccos(x) = -\frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\arccos(u) = -\frac{1}{\sqrt{1-u^2}} \cdot \frac{d}{dx}u$
Tangente inverse	$\frac{d}{dx}\arctan(x) = \frac{1}{1+x^2}$	$\frac{d}{dx}\arctan(u) = \frac{1}{1+u^2} \cdot \frac{d}{dx}u$
Cotangente inverse	$\frac{d}{dx}arc\cot(x) = -\frac{1}{1+x^2}$	$\frac{d}{dx}arc\cot(u) = -\frac{1}{1+u^2} \cdot \frac{d}{dx}u$