

Primitives

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$$k \longrightarrow kx$$

$$x^n \longrightarrow \frac{1}{n+1} x^{n+1}$$

$$\frac{1}{x} \longrightarrow \ln |x|$$

$$\frac{1}{\sqrt{x}} \longrightarrow 2\sqrt{x}$$

$$e^x \longrightarrow e^x$$

$$\cos(x) \longrightarrow \sin(x)$$

$$\sin(x) \longrightarrow -\cos(x)$$

$$u' u^n \longrightarrow \frac{1}{n+1} u^{n+1}$$

$$\frac{u'}{u} \longrightarrow \ln |u|$$

$$\frac{u'}{\sqrt{u}} \longrightarrow 2\sqrt{u}$$

$$\frac{u'}{u^2} \longrightarrow -\frac{1}{u}$$

$$u' e^u \longrightarrow e^u$$

$$u' \cos u \longrightarrow \sin u$$

$$\int_a^b f(x) dx = \left[F(x) \right]_a^b = F(b) - F(a)$$

Logarithme népérien

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$$1) \ln 1 = 0$$

$$2) \ln e = 1$$

$$3) \ln(e^x) = x$$

$$4) \ln(ab) = \ln a + \ln b$$

$$5) \ln\left(\frac{a}{b}\right) = \ln a - \ln b$$

$$6) \ln(a^m) = m \ln a$$

$$7) \ln a = \ln b \Rightarrow a = b$$

$$8) (\ln x)' = \frac{1}{x}$$

$$9) (\ln u)' = \frac{u'}{u}$$

Exponentielle

PROPRIÉTÉS

$$1) e^a \times e^b = e^{a+b}$$

$$2) \frac{e^a}{e^b} = e^{a-b}$$

$$3) \frac{1}{e^a} = e^{-a}$$

$$4) (e^a)^b = e^{a \times b}$$

$$5) e^{\frac{1}{2}} = \sqrt{e}$$

$$6) e^0 = 1$$

$$7) e^{\ln x} = x \quad \underline{(x > 0)}$$

$$8) \underline{e^1 = e}$$

DÉRIVÉES & LIMITES

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

$$2) (e^u)' = u' e^u$$

$$3) \lim_{x \rightarrow -\infty} e^x = \boxed{0}$$

$$4) \lim_{x \rightarrow +\infty} e^x = \boxed{+\infty}$$

$$5) \lim_{x \rightarrow -\infty} x e^x = \boxed{0}$$

$$6) \lim_{x \rightarrow +\infty} \frac{e^x}{x} = \boxed{+\infty}$$

$$7) \lim_{x \rightarrow 0} \frac{e^x - 1}{x} = \boxed{1}$$

*L'exponentielle : simple en apparence,
puissante en calcul !*

Dérivation

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① $(u + v)' = u' + v'$

$$(ku)' = ku'$$

.....

② $(uv)' = u'v + uv'$

.....

③ $\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2} \quad (v \neq 0)$

.....

④ $(v \circ u)(x) = u'(x) \cdot v'(\underline{u(x)})$

⑤ Usual derivatives :

★ $(k)' = 0$

★ $(x)' = 1$

★ $(x^n)' = n x^{n-1}$

★ $(e^x)' = e^x$

★ $(\ln x)' = \frac{1}{x}$

Exponentielle et Logarithme

Exponentielle

$$\textcircled{1} \quad e^a \times e^b = e^{a+b}$$

$$\textcircled{2} \quad \frac{e^a}{e^b} = e^{a-b}$$

$$\textcircled{3} \quad e^0 = 1$$

$$\textcircled{4} \quad \frac{1}{e^a} = e^{-a}$$

$$\textcircled{5} \quad (e^a)^m = e^{am}$$

$$\textcircled{6} \quad (e^x)' = e^x$$

$$\textcircled{7} \quad (e^u)' = u'e^u$$

$$\textcircled{8} \quad \lim_{x \rightarrow -\infty} e^x = 0$$

$$\textcircled{9} \quad \lim_{x \rightarrow +\infty} e^x = +\infty$$

Logarithme

$$\textcircled{1} \quad \ln(ab) = \ln a + \ln b$$

$$\textcircled{2} \quad \ln\left(\frac{a}{b}\right) = \ln a - \ln b$$

$$\textcircled{3} \quad \ln 1 = 0$$

$$\textcircled{4} \quad \ln\left(\frac{1}{a}\right) = -\ln a$$

$$\textcircled{5} \quad \ln(a^m) = m \ln a$$

$$\textcircled{6} \quad (\ln x)' = \frac{1}{x}$$

$$\textcircled{7} \quad (\ln u)' = \frac{u'}{u}$$

$$\textcircled{8} \quad \lim_{x \rightarrow 0^+} \ln x = -\infty$$

$$\textcircled{9} \quad \lim_{x \rightarrow +\infty} \ln x = +\infty$$

Trigonométrie

Identités de base

- $\sin^2(x) + \cos^2(x) = 1$

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

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

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

Dérivées

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

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

- $(\tan(x))' = 1 + \tan^2(x)$

Règle de la chaîne

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

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

Le minimum à connaître

$$\textcircled{1} \quad \left(\frac{1}{u}\right)' \rightarrow -\frac{u'}{u^2}$$

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

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$$\textcircled{3} \quad (\sqrt{u})' \rightarrow \frac{u'}{2\sqrt{u}}$$

$$\textcircled{4} \quad (\ln u)' \rightarrow \frac{u'}{u}$$

$$\textcircled{5} \quad (e^u)' \rightarrow u'e^u$$

$$\textcircled{6} \quad (u^n)' \rightarrow nu'u^{n-1}$$