

Chap 5

Soit $g(x) = f(ax + b)$. Alors $g'(x) = a \times f'(ax + b)$

exemple: $g(x) = \sin(2x + \frac{1}{2}) \rightarrow g'(x) = 2 \times \cos(2x + \frac{1}{2})$

• $f(x) = x^2 \rightarrow f'(x) = 2x$ donc $\frac{1}{2} \times f'(x) = x$

donc $f(x) = (\frac{1}{2} \times f'(x))^2 = \frac{1}{4} (f'(x))^2$

• $f(x) = \sqrt{x} \rightarrow f'(x) = \frac{1}{2\sqrt{x}}$ donc $f(x) \times f'(x) = \frac{1}{2}$

• $f(x) = \tan(x) = \frac{\sin(x)}{\cos(x)}$ pour $x \in]-\frac{\pi}{2}; \frac{\pi}{2}[$

$\rightarrow f'(x) = \frac{\cos(x) \times \cos(x) - \sin(x) \times (-\sin(x))}{\cos^2(x)} = \frac{\cos^2(x) + \sin^2(x)}{\cos^2(x)}$

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

$e \approx 2,7182812... \rightarrow f(x) = e^x = f'(x)$

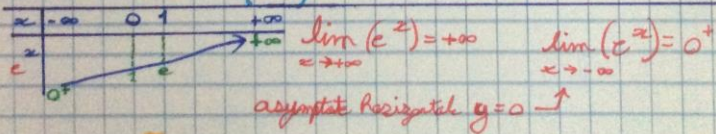
• $e^{a+b} = e^a \times e^b$ pour tout réel a et b

• $e^{-b} = \frac{1}{e^b} \rightarrow e^{-b} \times e^b = e^{-b+b} = e^0 = 1$

• $e^{a-b} = \frac{e^a}{e^b} \rightarrow e^{a-b} \times e^b = e^{a-b+b} = e^a$

• $e^{na} = (e^a)^n \rightarrow e^{na} = e^{\underbrace{a+a+\dots+a}_n} = \underbrace{e^a \times e^a \times \dots \times e^a}_n$

• $e^{\frac{1}{2}a} = \sqrt{e^a} \rightarrow (e^{\frac{1}{2}a})^2 = e^{2 \times \frac{1}{2}a} = e^a = (\sqrt{e^a})^2$



$\lim_{x \rightarrow +\infty} \frac{e^x}{x} = +\infty$ $\lim_{x \rightarrow -\infty} x e^x = 0$ $\lim_{x \rightarrow +\infty} \frac{1}{x} = 0$

Soit $g(x) = e^{ax+b}$. Alors $g'(x) = a \times e^{ax+b}$

exemples: $g(x) = e^{-x} \rightarrow g'(x) = -e^{-x}$

$g(x) = e^{4+3x} \rightarrow g'(x) = 3e^{4+3x}$

$g(x) = x^2 \times e^{2x} \rightarrow g'(x) = 2x \times e^{2x} + 2e^{2x} \times x^2 = 2x \times e^{2x} (1+x)$

Soit u une fonction dérivable sur un intervalle I . Alors $y = e^u$ est aussi dérivable sur I et $y' = e^u \times u'$

$g(x) = e^{\frac{1}{x}} \rightarrow g'(x) = -\frac{1}{x^2} \times e^{\frac{1}{x}}$

$g(x) = e^{(x^2)} \rightarrow g'(x) = 2x \times e^{(x^2)}$

$g(x) = e^{\sqrt{x}} \rightarrow g'(x) = \frac{1}{2\sqrt{x}} \times e^{\sqrt{x}}$

$g(x) = e^{\sin(x)} \rightarrow g'(x) = \cos(x) \times e^{\sin(x)}$

$g(x) = e^{\cos(x)} \rightarrow g'(x) = -\sin(x) \times e^{\cos(x)}$

$g(x) = e^{(e^x)} \rightarrow g'(x) = e^x \times e^{(e^x)} = e^{x+e^x}$