

Derivation

exercice :

$$\cdot f(x) = 4x^2 - 3x + 1$$

$$\hookrightarrow f'(x) = 4 \times 2x - 3$$
$$= 8x - 3$$

$$\cdot g(x) = 3x^4 - 2x^3 + 5x - 4$$

$$\hookrightarrow g'(x) = 3 \times 4x^3 - 2 \times 3x^2 + 5$$
$$= 12x^3 - 6x^2 + 5.$$

$$\cdot h(x) = -5x^8 - 9x^3 + x - 1$$

$$\begin{aligned} \hookrightarrow h'(x) &= -5 \times 8x^7 - 9 \times 3x^2 + 1 \\ &= -40x^7 - 27x^2 + 1 \end{aligned}$$

$$\cdot f(x) = 5x^3 - \frac{1}{x} + 3\sqrt{x}.$$

$$\begin{aligned} \hookrightarrow f'(x) &= 5 \times 3x^2 - \left(-\frac{1}{x^2}\right) + 3 \times \frac{1}{2\sqrt{x}} \\ &= 15x^2 + \frac{1}{x^2} + \frac{3}{2\sqrt{x}}. \end{aligned}$$

exercice :

$$f(x) = (x^2 + 1)(x^3 - 2x).$$

$$u(x) = x^2 + 1 \quad u'(x) = 2x$$

$$v(x) = x^3 - 2x \quad v'(x) = 3x^2 - 2$$

$$f'(x) = \overset{u'}{2x} \overset{v}{(x^3 - 2x)} + \overset{u}{(x^2 + 1)} \overset{v'}{(3x^2 - 2)}$$

$$= 2x^4 - 4x^2 + 3x^4 - 2x^2 + 3x^2 - 2$$

$$= 5x^4 - 3x^2 - 2.$$

$$\cdot f(x) = \frac{2x^2 - 3}{x^2 + 7}$$

$$u(x) = 2x^2 - 3 \quad u'(x) = 4x$$

$$v(x) = x^2 + 7 \quad v'(x) = 2x$$

$$f'(x) = \frac{4x(x^2 + 7) - 2x(2x^2 - 3)}{(x^2 + 7)^2}$$

$$= \frac{4x^3 + 28x - 4x^3 + 6x}{(x^2 + 7)^2}$$

$$= \frac{34x}{(x^2 + 7)^2}$$

$$\cdot f(x) = \frac{9}{2x+1}$$

$$u(x) = 2x+1 \quad u'(x) = 2$$

$$f'(x) = 9x - \frac{2}{(2x+1)^2}$$

$$= \frac{-18}{(2x+1)^2}.$$

$$\cdot f(x) = (2x+3)(3x-7).$$

$$\begin{aligned} f'(x) &= 2(3x-7) + 3(2x+3) \\ &= 6x - 14 + 6x + 9 \\ &= 12x - 5. \end{aligned}$$

$$\cdot f(x) = \frac{3x+2}{2-x}$$

$$\begin{aligned} f'(x) &= \frac{3(2-x) + 3x+2}{(2-x)^2} \\ &= \frac{8}{(2-x)^2} \end{aligned}$$

$$\cdot f(x) = \frac{-4x + 1}{3x + 5}.$$

$$f'(x) = \frac{-4(3x + 5) - 3(-4x + 1)}{(3x + 5)^2}$$

$$= \frac{-23}{(3x + 5)^2}.$$

exercice:

$$\bullet f(x) = x^3 - 3x + 1.$$

$$\rightarrow f'(x) = 3x^2 - 3$$

$$\rightarrow 3x^2 - 3 \rightarrow \text{second degré}$$

$$\begin{aligned}\Delta &= b^2 - 4ac = 0^2 - 4 \times 3 \times (-3) \\ &= 36 > 0\end{aligned}$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-6}{2 \times 3} = -1$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{+6}{2 \times 3} = 1.$$

x	$- \infty$	-1	1	$+\infty$
δ'	$+$	0	0	$+$
δ		$\nearrow 3$	$\searrow -1$	$\nearrow$

$$\bullet f(x) = (2x+3)(3x-7).$$

$$f'(x) = 2(3x-7) + 3(2x+3)$$

$$= 6x - 14 + 6x + 9$$

$$= 12x - 5.$$

$$\bullet 12x - 5 = 0$$

$$\Leftrightarrow 12x = 5 \quad \Leftrightarrow x = \frac{5}{12}$$

x	3	$\frac{5}{12}$	7
f'	—	$\bigcirc$	+
f	18	$\frac{-329}{24}$	-258

$$ax + b$$

$$a > 0$$

$$a < 0$$

x	$-\infty$	$-b/a$	$+\infty$
sign	$-$	0	$+$

x	$-\infty$	$-b/a$	$+\infty$
sign	$+$	0	$-$