

# Test Dérivées

Exercice 1  $f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$

$$f(x) = \frac{2}{x-1}, \quad a=3 \Rightarrow f(3) = \frac{2}{3-1} = 1$$

$$\begin{aligned} f'(3) &= \lim_{x \rightarrow 3} \frac{\frac{2}{x-1} - 1}{x-3} = \lim_{x \rightarrow 3} \frac{2 - (x-1)}{(x-1)(x-3)} = \lim_{x \rightarrow 3} \frac{3-x}{(x-1)(x-3)} \\ &= \lim_{x \rightarrow 3} \frac{-(x-3)}{(x-1)(x-3)} = \lim_{x \rightarrow 3} \frac{-1}{x-1} = -\frac{1}{3-1} = -\frac{1}{2} \end{aligned}$$

## Exercice 2

a)  $5x^4 - 9x^2 + 2x - 5$

b)  $\frac{6}{4}x + \frac{15}{3}x^2 = \frac{3}{2}x + 5x^2$

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

d) 0

e)  $(3(1-x)^{\frac{3}{2}})' = \frac{3}{2}(1-x)^{-\frac{1}{2}} \cdot (-1) = -\frac{3}{2\sqrt{1-x}}$

f)  $[(2x-1)^3] \cdot (x^2+4)^4 + (2x-1)^3 \cdot [(x^2+4)^4]'$   
 $= 3(2x-1)^2 \cdot 2 \cdot (x^2+4)^4 + (2x-1)^3 \cdot 4 \cdot (x^2+4)^3 \cdot 2x$   
 $= (2x-1)^2 \cdot (x^2+4)^3 [6 \cdot (x^2+4) + (2x-1) \cdot 8x]$   
 $= (2x-1)^2 (x^2+4)^3 [6x^2 + 24 + 16x^2 - 8x]$   
 $= (2x-1)^2 (x^2+4)^3 (22x^2 - 8x + 24)$   
 $= (2x-1)^2 (x^2+4)^3 2(11x^2 - 4x + 12)$

$$\Delta = 8^2 - 4 \cdot 11 \cdot 12 = -464 < 0 \rightarrow \text{pas plus factorisable}$$

$$= 2(2x-1)^2 (x^2+4)^3 (11x^2 - 4x + 12)$$

g)  $(x^{\frac{2}{3}})' = \frac{2}{3}x^{-\frac{1}{3}} = \frac{2}{3\sqrt[3]{x}}$

h)  $\left(\frac{x-1}{x+1}\right)' = \frac{x+1 - (x-1)}{(x+1)^2} = \frac{2}{(x+1)^2}$

i)  $(4x-9)' + (x^{-3})' = 4 + (-3x^{-4}) = 4 - \frac{3}{x^4}$